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. Bookhartz 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 agricultural industry.

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

### Freshman Year

#### First Semester
1. 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. 16-17

#### Second Semester
1. AGED 1000 Orientation and Field Experience
2. AGM 2210 Surveying
3. CH 1010 General Chemistry
4. CH 1020 General Chemistry
5. EXST 3010 Introductory Statistics
6. ENGL 1010 Accelerated Composition
7. Social Science Requirement
8. 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. HORT 2120 Introduction to Turfgrass Culture I
6. HORT 2130 Turfgrass Culture Lab.
7. 17

#### Second Semester
1. CH 1020 General Chemistry
2. COMM 1010 Communication Academic and Professional Development
3. EDSP 3700 Introduction to Special Education
4. EXST 3010 Introductory Statistics
5. PHYS 2070 General Physics I
6. Technical Requirement
7. 16-17

*See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. Note: ANTH 2010, GEOG 1030 or HIST 1730 is recommended to satisfy the Social Science Requirement.

### 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. AGED 3040 Applied Agriculture Calculations
2. CH 1010 General Chemistry
3. EDSP 3700 Introduction to Special Education
4. EXST 3010 Introductory Statistics
5. PHYS 2070 General Physics I
6. Technical Requirement
7. 18

### Senior Year

#### First Semester
1. AGED 4070 Internship in Extension and Leadership Education
2. 134-135 Total Semester Hours

### LEADERSHIP EMPHASIS AREA

#### Junior Year

#### First Semester
1. AGED 3030 Mech. Technology for Agric. Ed.
2. AGM 2210 Surveying
3. CSEN 2020 Soils
4. HORT 3030 Landscape Plants
5. Advanced Writing Requirement
6. Arts and Humanities (Literature) Requirement
7. Departmental Communication Requirement
8. Technical Requirement
9. 19

#### Second 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

#### 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
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.

Graduates in Agricultural Mechanization and Business find meaningful and remunerative employment in a variety of situations directly and indirectly related to agricultural production, processing, marketing, and the many services connected therewith. Farming and technical sales in the agricultural, industrial, and heavy equipment industries are frequently chosen careers.

By completing this curriculum, graduates will have fulfilled the requirements for an Agricultural Business Management minor or other selected minor. Contact the Enrolled Student Services Office to have the minor recorded.

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

Freshman Year

First Semester
1. AGM 1010 Intro. to Ag. Mech. and Business
2. AGM 2050 Principles of Fabrication
3. APEC 2020 Agricultural Economics or
   ECON 2110 Principles of Microeconomics
4. BIOL 1030 General Biology I
5. BIOL 1050 General Biology Lab. I
6. MTHS 1020 Intro. to Mathematical Analysis
7. ENGL 1030 Accelerated Composition

Second Semester
1. ACCT 2010 Principles of Management
2. AGM 4190 Agribusiness Innov./Entrepren.
3. MKT 3010 Principles of Marketing
4. APEC 3090 Econ. of Agricultural Marketing

Sophomore Year

First Semester
1. AGM 2190 Agribusiness and Food Systems
2. AGM 2210 Surveying
3. CH 1010 General Chemistry
5. PHYS 2020 Introductory Physics
6. PHYS 2070 General Physics I and
7. PHYS 2090 General Physics Lab.

Second Semester
1. CHEM 2020 Introductory Chemistry
2. CHEM 2040 General Chemistry II
4. PHYS 2020 Introductory Physics
5. PHYS 2070 General Physics I
6. PHYS 2090 General Physics Lab.

Junior Year

First Semester
1. AGM 3100 Soil and Water Conservation
2. AGM 3190 Agribusiness Decision Analysis
3. AGM 4050 Environmental Control in Animal Structures
4. APEC 3020 Economics of Farm Management or
   MKT 2010 Principles of Management
5. CSEN 4020 Soils

Second Semester
1. AGM 4020 Drainage and Irrigation
2. AGM 4520 Mobile Power
3. EXST 3010 Introductory Statistics or
   MTHS 2030 Elem. Statistical Inference
4. APEC 3090 Econ. of Agricultural Marketing
5. Minor Requirement

Senior Year

First Semester
1. AGM 4000 Senior Seminar in AGM
2. AGM 4600 Mechanical and Hydraulic Systems
3. AGM 4600 Electrical Systems
4. APEC 3190 Agribusiness Management or
   MKT 2010 Principles of Management
5. MKT 3010 Principles of Marketing
6. APEC 3090 Econ. of Agricultural Marketing
7. Minor Requirement

Second Semester
1. AGM 4100 Precision Agriculture Technology
2. AGM 4720 Capstone or
   AGM 4190 Agribusiness Innov./Entrepren.
3. Minor Requirement
4. Plant/Crop Science Requirement
5. Social Science Requirement

Total Semester Hours
124

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.

Graduates in Agricultural Mechanization and Business find meaningful and remunerative employment in a variety of situations directly and indirectly related to agricultural production, processing, marketing, and the many services connected therewith. Farming and technical sales in the agricultural, industrial, and heavy equipment industries are frequently chosen careers.

By completing this curriculum, graduates will have fulfilled the requirements for an Agricultural Business Management minor or other selected minor. Contact the Enrolled Student Services Office to have the minor recorded.

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

Freshman Year

First Semester
1. AGM 1010 Intro. to Ag. Mech. and Business
2. AGM 2050 Principles of Fabrication
3. APEC 2020 Agricultural Economics or
   ECON 2110 Principles of Microeconomics
4. BIOL 1030 General Biology I
5. BIOL 1050 General Biology Lab. I
6. MTHS 1020 Intro. to Mathematical Analysis
7. ENGL 1030 Accelerated Composition

Second Semester
1. ACCT 2010 Principles of Management
2. AGM 4190 Agribusiness Innov./Entrepren.
3. MKT 3010 Principles of Marketing
4. APEC 3090 Econ. of Agricultural Marketing

Sophomore Year

First Semester
1. AGM 2190 Agribusiness and Food Systems
2. AGM 2210 Surveying
3. CH 1010 General Chemistry
5. PHYS 2020 Introductory Physics
6. PHYS 2070 General Physics I and
7. PHYS 2090 General Physics Lab.

Second Semester
1. CHEM 2020 Introductory Chemistry
2. CHEM 2040 General Chemistry II
4. PHYS 2020 Introductory Physics
5. PHYS 2070 General Physics I
6. PHYS 2090 General Physics Lab.

Junior Year

First Semester
1. AGM 3100 Soil and Water Conservation
2. AGM 3190 Agribusiness Decision Analysis
3. AGM 4050 Environmental Control in Animal Structures
4. APEC 3020 Economics of Farm Management or
   MKT 2010 Principles of Management
5. CSEN 4020 Soils

Second Semester
1. AGM 4020 Drainage and Irrigation
2. AGM 4520 Mobile Power
3. EXST 3010 Introductory Statistics or
   MTHS 2030 Elem. Statistical Inference
4. APEC 3090 Econ. of Agricultural Marketing
5. Minor Requirement

Senior Year

First Semester
1. AGM 4000 Senior Seminar in AGM
2. AGM 4600 Mechanical and Hydraulic Systems
3. AGM 4600 Electrical Systems
4. APEC 3190 Agribusiness Management or
   MKT 2010 Principles of Management
5. MKT 3010 Principles of Marketing
6. APEC 3090 Econ. of Agricultural Marketing
7. Minor Requirement

Second Semester
1. AGM 4100 Precision Agriculture Technology
2. AGM 4720 Capstone or
   AGM 4190 Agribusiness Innov./Entrepren.
3. Minor Requirement
4. Plant/Crop Science Requirement
5. Social Science Requirement

Total Semester Hours
124
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.
3 - AVS 1500 Introduction to Animal Science
1 - AVS 1510 Introduction to Animal Science Lab.
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I or
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
16-18
Second Semester
1 - BIOL 1060 General Biology Lab. II
3 - BIOL 1040 General Biology II
3 - Arts and Humanities (Literature) Requirement1
2 - AVS Evaluation Requirement2
2 - AVS Techniques Requirement2
3 - Social Science Requirement1
16
Junior Year
First Semester
4 - AVS 3010 Anat. and Phys. of Domestic Animals
3 - AVS 3700 Principles of Animal Nutrition
3 - AVS 4700 Animal Genetics
3 - CSEN 4230 Field Crops—Forages
2 - MTHS 1020 Intro. to Mathematics
2 - MTHS 1030 General Biology I
2 - AVS Techniques Requirement2
14
Second Semester
3 - AVS 3750 Applied Animal Nutrition
3 - AVS 4130 Animal Products
3 - AVS 4530 Animal Reproduction
3 - LAW 3220 Legal Environment of Business
3 - Elective
3 - AVS Techniques Requirement2
15
Senior Year
First Semester
3 - AVS 3100 Animal Health
3 - AVS 4010 Animal and Veterinary Sciences Professional Development
3 - AVS 4150 Contemporary Issues in Animal Sci.
3 - MKT 3010 Principles of Marketing
2 - AVS Experience-Based Activity4
2 - AVS Techniques Requirement2
14
Second Semester
2 - AVS 4060 Seminars and Related Topics
3 - AVS 4100 Domestic Animal Behavior
2 - AVS 4170 Animal Agribusiness Development
3 - AVS Experience-Based Activity4
4 - Production Class5
2 - Elective
16
123–126 Total Semester Hours
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, 3100, 3120, 4060 or 4350
3Select from AVS 3020, 3090, 3100 or 3230
4Select from AVS 3600, 3900, 4410, 4420, 4430, 4440 or 4910
5Select from AVS 4500, 4010 or 4120

EQUINE BUSINESS CONCENTRATION

Freshman Year
First Semester
1 - AVS 1000 Orientation to Animal and Vet. Sci.
3 - AVS 1500 Introduction to Animal Science
1 - AVS 1510 Introduction to Animal Science Lab.
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I or
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
3 - Arts and Humanities (Non-Lit.) Requirement1
16-17
Second Semester
3 - 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 1010 Essen. Math. for Inform. Soc. or
3 - MTHS 1020 Intro. to Math. Analysis or
4 - MTHS 1060 Calculus of One Variable I
2 - AVS Techniques Requirement2
16-18
Sophomore Year
First Semester
2 - AVS 2040 Horse Care Techniques
3 - ACCT 2010 Financial Accounting Concepts
3 - ECON 2110 Principles of Microeconomics
3 - FIN 3060 Corporation Finance
2 - AVS 3090 Principles of Equine Evaluation
3 - Social Science Requirement1
14
Second Semester
2 - AVS 3090 Principles of Equine Evaluation
3 - ECON 2110 Principles of Microeconomics
3 - FIN 3060 Corporation Finance
3 - Arts and Humanities (Literature) Requirement1
2 - AVS Techniques Requirement2
3 - Social Science Requirement1
16
Junior Year
First Semester
4 - AVS 3010 Anat. and Phys. of Domestic Animals
3 - AVS 3700 Principles of Animal Nutrition
3 - AVS 4700 Animal Genetics
3 - CSEN 4230 Field Crops—Forages
2 - MTHS 1010 General Chemistry
16-17
Second Semester
3 - AVS 3750 Applied Animal Nutrition
3 - AVS 4130 Animal Products
3 - AVS 4530 Animal Reproduction
3 - LAW 3220 Legal Environment of Business
3 - Elective
15

Sophomore Year
First Semester
3 - AVS 3100 Animal Health
3 - AVS 4010 Animal and Veterinary Sciences Professional Development
3 - AVS 4150 Contemporary Issues in Animal Sci.
3 - MKT 3010 Principles of Marketing
2 - AVS Experience-Based Activity4
2 - AVS Techniques Requirement2
14
Second Semester
2 - AVS 4060 Seminars and Related Topics
3 - AVS 4100 Domestic Animal Behavior
2 - AVS 4170 Animal Agribusiness Development
3 - AVS Experience-Based Activity4
4 - Production Class5
2 - Elective
16
123–126 Total Semester Hours
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, 3100, 3120, 4060 or 4350
3Select from AVS 3020, 3090, 3100 or 3230
4Select from AVS 3600, 3900, 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

**Second Semester**
1. AVS 4100 Domestic Animal Behavior
2. AVS 4120 Advanced Equine Management
3. AVS 4170 Animal Agribusiness Development
4. Elective

121–124 Total Semester Hours

### Junior Year

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

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

14

### Sophomore Year

**First Semester**
1. AVS 4000 Animal and Veterinary Sciences Professional Development
2. AVS 4060 Seminars and Related Topics
4. AVS Techniques Requirement
5. Departmental Requirement
6. Elective

16–17

**Second Semester**
1. AVS 4100 Domestic Animal Behavior
2. AVS 4130 Animal Products
4. AVS Techniques Requirement
5. Social Science Requirement

16

122–125 Total Semester Hours

### Senior Year

**First Semester**
1. AVS 4000 Animal and Veterinary Sciences Professional Development
2. AVS 4060 Seminars and Related Topics
4. AVS Techniques Requirement
5. Departmental Requirement
6. Elective

14

**Second Semester**
1. AVS 4100 Domestic Animal Behavior
2. AVS 4130 Animal Products
4. AVS Techniques Requirement
5. Social Science Requirement

14

### 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 MTHS 2030 Elem. Statistical Inference
4. PHYS 2080 General Physics II
5. PHYS 2100 General Physics II Lab.
6. AVS Techniques Requirement
7. Oral Communication Requirement

16

### Junior Year

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

16

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

14

### Senior Year

**First Semester**
1. AVS 4000 Animal and Veterinary Sciences Professional Development
2. AVS 4060 Seminars and Related Topics
4. AVS Techniques Requirement
5. Social Science Requirement

14

### 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
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
14

Second Semester
1. BCHM 4310 Physical Approach to Biochem.
2. BCHM 4330 General Biochemistry Lab. I
3. CH 3300 Introduction to Physical Chemistry
4. Elective
5. Science Requirement
16-17

Sophomore Year
First Semester
1. CH 2230 Organic Chemistry
2. CH 2270 Organic Chemistry Lab.
3. GEN 3020 Molecular and General Genetics
2. GEN 3030 Molecular and Gen. Genetics Lab.
3. PHYS 1220 Physics with Calculus I
1. PHYS 1240 Physics Lab. I
3-4. Advanced Mathematics Requirement
15

Second Semester
1. BCHM 3010 Molecular Biochemistry
2. CH 2240 Organic Chemistry
3. CH 2280 Organic Chemistry Lab.
2. COMM 1500 Intro. to Human Comm. or COMM 2500 Public Speaking
3. PHYS 2210 Physics with Calculus II
1. PHYS 2230 Physics Lab. II
3. Arts and Humanities (Literature) Requirement
17

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
3. Science Requirement
5. Elective
16

Second Semester
1. BCHM 4320 Biochemistry of Metabolism
2. BCHM 4340 General Biochemistry Lab. II
3. BCHM 4360 Molecular Biol.; Genes to Proteins
3. PHIL 3260 Science and Values
3. Science Requirement
14

Senior Year
First Semester
1. BIOL 4610 Cell Biology
2. GEN (BCHM) 4400 Bioinformatics
3. Social Science Requirement
5. Elective
13

Second Semester
1. BCHM 4930 Senior Seminar
2. Science Requirement
3. Social Science Requirement
6. Elective
14

120–121 Total Semester Hours

See General Education Requirements.

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**
5. BIOL 1110 Principles of Biology II
4. CH 1020 General Chemistry
3. ENGL 1030 Accelerated Composition
3. Mathematical Sciences Requirement
15-16

**Sophomore Year**

**First Semester**
3. CH 2230 Organic Chemistry and
1. CH 2270 Organic Chemistry Lab. or
4. CH 2010 Survey of Organic Chemistry
3. GEN 3000 Fundamental Genetics
3. Arts and Humanities (Literature) Requirement
4. 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 or
3. Elective
4. Major Requirement
3. Social Science Requirement
3. Elective

**Junior Year**

**First Semester**
3. BIOL 3350 Evolutionary Biology or
3. Elective
3. BIOL 4610 Cell Biology
2. BIOL 4620 Cell Biology Lab.
3. PHYS 2070 General Physics I and
2. PHYS 2090 General Physics I Lab. or
1. PHYS 2070 General Physics Lab. I
3. Ecology Requirement
3. Entomology Requirement

**Second Semester**
9. Major Requirement
3. Social Science Requirement
3. Elective

**Senior Year**

**First Semester**
3. BIOL 4610 Cell Biology
2. BIOL 4620 Cell Biology Laboratory
4. 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
3. Ecology Requirement
3. Entomology Requirement

**Second Semester**
3. ENGL 3150 Scientific Writing and Comm. 4. 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 (Non-Lit.) Requirement
3. Entomology Requirement
3. Functional Biology Requirement
16

**Senior Year**

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

**Second Semester**
4. Entomology Requirement
3. Major Requirement
6. Elective
13

**ENTOMOLOGY EMPHASIS AREA**

*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 2010 Survey of Organic Chemistry
3. GEN 3000 Fundamental Genetics
3. Arts and Humanities (Literature) Requirement
4. 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 or
3. Elective
4. Major Requirement
3. Social Science Requirement
3. Elective

**Junior Year**

**First Semester**
3. BIOL 3350 Evolutionary Biology or
3. Elective
3. BIOL 4610 Cell Biology
2. BIOL 4620 Cell Biology Lab.
3. PHYS 2070 General Physics I and
2. PHYS 2090 General Physics I Lab. or
1. PHYS 2070 General Physics Lab. I
3. Ecology Requirement
3. Entomology Requirement

**Second Semester**
9. Major Requirement
3. Social Science Requirement
3. Elective

**Senior Year**

**First Semester**
3. BIOL 4610 Cell Biology
2. BIOL 4620 Cell Biology Laboratory
4. 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
3. Ecology Requirement
3. Entomology Requirement

**Second Semester**
3. ENGL 3150 Scientific Writing and Comm. 4. 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 (Non-Lit.) Requirement
3. Entomology Requirement
3. Functional Biology Requirement
16

**Senior Year**

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

**Second Semester**
4. Entomology Requirement
3. Major Requirement
6. Elective
13

121-122 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 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 2000 level or higher.*

*EXT 3010, MTHS 2320 or 1110, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.*

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

*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.*

*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.*

*Twenty-one credit hours. At least seventeen credit hours must come from BIOL or MICR courses at the 3000 level or higher, four credit hours of which must be laboratory. Up to four credit hours may come from CH 2240/2280 or courses on the department-approved list. Any combination of BIOL 4910, 4920, 4940 and 4950 may not exceed eight credit hours.*

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

*At least one course selected from BIOL 3360, 4010, 4080, 4590, 4750, or 4800.*

**ENTOMOLOGY EMPHASIS AREA**

*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 2010 Survey of Organic Chemistry
3. GEN 3000 Fundamental Genetics
3. Arts and Humanities (Literature) Requirement
4. 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 or
3. Elective
4. Major Requirement
3. Social Science Requirement
3. Elective

**Junior Year**

**First Semester**
3. CH 2230 Organic Chemistry and
1. CH 2270 Organic Chemistry Lab. or
4. CH 2010 Survey of Organic Chemistry
3. GEN 3000 Fundamental Genetics
3. Arts and Humanities (Literature) Requirement
4. 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
4. Major Requirement
3. Social Science Requirement
3. Elective

**Senior Year**

**First Semester**
3. BIOL 4610 Cell Biology
2. BIOL 4620 Cell Biology Laboratory
4. 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
3. Ecology Requirement
3. Entomology Requirement

**Second Semester**
3. ENGL 3150 Scientific Writing and Comm. 4. 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 (Non-Lit.) Requirement
3. Entomology Requirement
3. Functional Biology Requirement
16

**Senior Year**

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

**Second Semester**
4. Entomology Requirement
3. Major Requirement
6. Elective
13

121-122 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 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 2000 level or higher.*

*EXT 3010, MTHS 2320 or 1110, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.*

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

*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.*

*Seven credit hours must be selected from BIOL or MICR courses at the 3000 level or above or CH 2240/2280.*

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

*At least one course selected from BIOL 3360, 4010, 4080, 4590, 4750, or 4800.*
PREPHARMACY EMPHASIS AREA

Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
2 - BIOL 1030 General Biology I
3 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
5 - COMM 1530 Intro. to Human Comm. or
6 - COMM 2500 Public Speaking
7 - MTHS 1060 Calculus of One Variable I
8 - Elective
12 - 14 Total Semester Hours

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
4 - Elective
16

Sophomore Year
First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab. or
4 - CH 2100 Survey of Organic Chemistry
3 - GEN 3000 Fundamental Genetics
3 - Arts and Humanities (Literature) Requirement
3 - Organismal Diversity Requirement
2 - Elective
16

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
16

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. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Economics Requirement
17

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
12

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - Ecology Requirement
3 - Major Requirement
5 - Elective
13
Second Semester
4 - BCHM 3050 General Microbiology
3 - Major Requirement
6 - Elective
13
121–122 Total Semester Hours

PHARMACY EMPHASIS AREA

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 2100 Survey of Organic Chemistry
4 - Organismal Diversity Requirement
3 - Partial Differential Equations Requirement
2 - Elective
16

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
16

Junior Year
First Semester
3 - 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. or
3 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I
3 - Arts and Humanities (Non-Lit.) Requirement
2 - Economics Requirement
17

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
17

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - GEN 4400 Bioinformatics
3 - Functional Biology Requirement
3 - Social Science Requirement
2 - Elective
12

Second Semester
1 - BIOL 4910 Undergraduate Research
3 - Arts and Humanities (Non-Lit.) Requirement
8 - Elective
8
122 Total Semester Hours

1–2 extra credits from departmental course offerings at the 3000 level or above or from the department-approved list.

QUANTITATIVE BIOLOGY EMPHASIS AREA

See Bachelor of Science curriculum for freshman year requirements.

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - Ecology Requirement
3 - Major Requirement
5 - Elective
13
Second Semester
4 - BCHM 3050 General Microbiology
3 - Major Requirement
6 - Elective
13
121–122 Total Semester Hours

1See advisor. Medical/dental schools have different mathematics requirements.
2At least one course 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.
3At 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.
4At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or BCHM 4010.
5At 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.
6At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or BCHM 4010.
7See advisor. Medical/dental schools have different mathematics requirements.
8At least one course selected from BIOL 3160, 4010, 4080, 4490, 4570, or 4800.
9At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

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 2100 Survey of Organic Chemistry
4 - Organismal Diversity Requirement
3 - Partial Differential Equations Requirement
2 - Elective
16

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
16

Junior Year
First Semester
3 - BIOL 3150 Evolutionary Biology
3 - BIOL 4610 Cell Biology
2 - BIOL 4620 Cell Biology Laboratory
3 - EXST 3010 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
15

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
17

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - GEN 4400 Bioinformatics
3 - Functional Biology Requirement
3 - Social Science Requirement
2 - Elective
12

Second Semester
1 - BIOL 4910 Undergraduate Research
3 - Arts and Humanities (Non-Lit.) Requirement
8 - Elective
8
122 Total Semester Hours

1BIOL 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.
2Most professional health sciences schools require two semesters of organic chemistry with laboratory.
3Or other approved coursework at the 3000-level or above or from the department-approved list.
4At 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.
5See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.
6See advisor. Medical/dental schools have different mathematics requirements.
7At 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.
8At least one lecture and associated laboratory selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.
9At least one course selected from BIOL 3160, 4010, 4080, 4490, 4570, or 4800.

College of Agriculture, Forestry and Life Sciences
### Junior Year

**First Semester**
- CH 3170 Quantitative Analysis Lab.
- CH 3130 Quantitative Analysis
- BIOL 4930 Senior Seminar
- Elective

**Second Semester**
- BIOL 4610 Cell Biology
- BIOL 4620 Cell Biology Laboratory
- CH 3010 Scientific Writing and Comm.
- Elective

**Senior Year**

**First Semester**
- ENGL 3150 Scientific Writing and Comm.
- BIOL 4620 Cell Biology Laboratory
- CH 3170 Quantitative Analysis Lab.
- Elective

**Second Semester**
- BIOL 4610 Cell Biology
- BIOL 4620 Cell Biology Laboratory
- Elective
- Elective

### Sophomore Year

**First Semester**
- BIOL 1110 Principles of Biology I
- CH 1010 General Chemistry
- COMM 1500 Intro. to Human Comm. or COMM 2500 Public Speaking
- MTHS 1060 Calculus of One Variable I

**Second Semester**
- BIOL 1110 Principles of Biology II
- CH 1020 General Chemistry
- ENGL 1030 Accelerated Composition
- Mathematical Sciences Requirement

### Junior Year

**First Semester**
- BIOL 3310 Evolutionary Biology or ETOX 4300 Toxicology
- PHYS 2010 General Physics II Lab.
- Elective
- Elective

**Second Semester**
- BIOL 3310 Evolutionary Biology or ETOX 4300 Toxicology
- PHYS 2010 General Physics II Lab.
- Elective
- Elective

**Senior Year**

**First Semester**
- ENGL 4130 Chemistry of Aqueous Systems or CH 2230 Organic Chemistry
- GEN 3000 Fundamental Genetics
- Arts and Humanities (Non-Lit.) Requirement
- Foreign Language Requirement
- Social Science Requirement

**Second Semester**
- BIOL 3010 Molecular Biochemistry or BCHM 3050 Essential Elements of Bioch.
- BCHM 3050 Essential Elements of Bioch.
- Foreign Language Requirement
- Major Requirement
- Organismal Diversity Requirement

### BIOLOGICAL SCIENCES

**Bachelor of Arts**

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

**Double Major in Biological Sciences/Science Teaching—Biological Sciences**

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

**Freshman Year**

**First Semester**
- BIOL 1010 Frontiers in Biology 1
- BIOL 1100 Principles of Biology I 2
- CH 1010 General Chemistry
- COMM 1500 Intro. to Human Comm. or COMM 2500 Public Speaking
- MTHS 1060 Calculus of One Variable I 17

**Second Semester**
- BIOL 1110 Principles of Biology II 1
- CH 1020 General Chemistry
- ENGL 1030 Accelerated Composition
- Mathematical Sciences Requirement 15-16

**Sophomore Year**

**First Semester**
- CH 2230 Organic Chemistry 4 and
- CH 2270 Organic Chemistry Lab or
- CH 2100 Survey of Organic Chemistry
- GEN 3000 Fundamental Genetics
- Arts and Humanities (Literature) Requirement
- Foreign Language Requirement
- Social Science Requirement

**Second Semester**
- CH 2010 Survey of Organic Chemistry
- GEN 3000 Fundamental Genetics
- Arts and Humanities (Literature) Requirement
- Foreign Language Requirement
- Social Science Requirement

**Junior Year**

**First Semester**
- BIOL 3310 Evolutionary Biology
- BIOL 4610 Cell Biology
- BIOL 4620 Cell Biology Laboratory
- CH 3150 Scientific Writing and Comm.
- Foreign Language Requirement
- Minor Requirement

**Second Semester**
- Arts and Humanities (Non-Lit.) Requirement
- Foreign Language Requirement
- Ecology Requirement
- Minor Requirement
- Minor Requirement

**Senior Year**

**First Semester**
- BIOL 4930 Senior Seminar
- PHYS 2070 General Physics I
- PHYS 2090 General Physics I Lab.
- Functional Biology Requirement
- Social Science Requirement

**Second Semester**
- PHYS 2080 General Physics II
- PHYS 2100 General Physics II Lab.
- Minor Requirement
- Elective

### Cross-Cultural Awareness

Students seeking a double major in Science Teaching and Biological Sciences should substitute ED 1050 for BIOL 1010. 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 credits required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 3000 level or higher.

### Additional Requirements

Students seeking a double major in Science Teaching and Biological Sciences should substitute ED 1050 for BIOL 1010. 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 credits required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 3000 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.
PREREHABILITATION SCIENCES
EMPHASIS AREA

Freshman Year
First Semester
1 - BIOL 1010 Frontiers in Biology I
2 - BIOL 1030 General Biology I and
3 - 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 and
1 - BIOL 1060 General Biology Lab. II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Statistics Requirement

Sophomore Year
First Semester
4 - CH 2010 Survey of Organic Chemistry
3 - GEN 3000 Fundamental Genetics
4 - Foreign Language Requirement
4 - Organismal Diversity Requirement

Second Semester
3 - BCHM 3010 Molecular Biochemistry or
3 - BCHM 3050 Essential Elements of Bioch.
3 - PSYC 2010 Introduction to Psychology
3 - Arts and Humanities (Literature) Requirement
4 - Foreign Language Requirement
3 - Social Science Requirement

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 Requirement

Second Semester
4 - BIOL 3160 Human Physiology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Foreign Language Requirement
6 - Minor Requirement

Senior Year
First Semester
2 - BIOL 4930 Senior Seminar
3 - ENGL 3150 Scientific Writing and Comm.
1 - PHYS 2070 General Physics I
1 - PHYS 2090 General Physics I Lab.
3 - Ecology Requirement
3 - Minor Requirement

Second Semester
3 - PHYS 2080 General Physics II
1 - PHYS 2100 General Physics II Lab.
6 - Minor Requirement
3 - Physical Education Requirement
3 - MTHS 2200 Calculus of One Variable II
15

122 Total Semester Hours

CONSERVATION BIOLOGY
CONCENTRATION

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

Three concentrations are offered within the Environmental and Natural Resources major, 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.

Grades 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)
1 - ENR 1010 Intro. to Env. and Natural Res. I
3 - MTHS 1020 Intro. to Mathematical Analysis
3 - Oral Communications Requirement

Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1020 or 1060 (Chemistry Requirement)
3 - ENGL 1030 Accelerated Composition
3 - EXST 3010 Introductory Statistics
1 - FNR 1020 FNR Freshman Portfolio

Sophomore Year
First Semester
4 - APEC 2570 Natural Resources, Environment, and Economics
3 - ECON 2110 Principles of Microeconomics
4 - BIOL 3200 Field Botany and
1 - Elective
2 - FOR 2050 Dendrology and
2 - FOR 2210 Forest Biology
3 - CH 1020 Organic Chemistry
4 - FNR 2040 Soil Information Systems or
4 - CSEN 2020 Soils

Second Semester
3 - GEN 3000 Fundamental Genetics
3 - WFB (BIOL) 3130 Conservation Biology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Physical Environment Requirement
3 - Taxonomy/Habitat Requirement

Junior Year
First Semester
3 - BIOL 3350 Evolutionary Biology
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Ecology Requirement
3 - Natural Resource Economics Requirement
3 - Taxonomy/Habitat Requirement

15
### Second Semester
- 3 - ENGL 3140 Technical Writing
- 3 - ENR 3020 Natural Resource Measurements
- 3 - Ecology Requirement^2
- 3 - Geology Requirement^1
- 3 - Taxonomy/Habitat Requirement^1

### Senior Year
#### First Semester
- 3 - ENR (BIOL) 4130 Restoration Ecology
- 3 - ENR 4500 Conservation Issues
- 1 - FOR 4980 Senior Portfolio
- 1 - WFB 4980 Senior Portfolio
- 6 - Taxonomy/Habitat Requirement^1
- 2 - Elective

**120 Total Semester Hours**

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

**120 Total Semester Hours**

### Sophomore Year
#### First Semester
- 3 - APEC 2570 Natural Resources, Environment and Economics or
- 3 - ECON 2110 Principles of Microeconomics
- 3 - POSC 1010 American National Government or
- 3 - POSC 1020 Intro. to International Relations
- 3 - Geography Requirement^1
- 3 - Natural Science Requirement^1
- 3 - Elective

**15**

#### Second Semester
- 3 - APEC (CRD) 3570 Natural Res. Economics
- 3 - ECON 2120 Principles of Macroeconomics
- 3 - Arts and Humanities (Literature) Requirement^1
- 3 - Arts and Humanities (Non-Lit.) Requirement^1
- 3 - Elective

**15**

### Junior Year
#### First Semester
- 3 - ECON 3140 Intermediate Microeconomics
- 3 - ENR 4290 Environmental Law and Policy
- 3 - Advanced Writing Requirement^2
- 3 - Applied Economics Requirement^4
- 3 - Natural Science Requirement^1

**15**

#### Second Semester
- 3 - APEC 4750 Wildlife Economics
- 3 - ENSP 4000 Studies in Environmental Science
- 3 - EXST 4620 Statistics Applied to Economics
- 3 - Macroeconomics Requirement^2
- 3 - Natural Science Requirement^1

**15**

### Senior Year
#### First Semester
- 3 - APEC 4570 Natural Resource Use, Technology, and Policy
- 3 - ECON 3190 Environmental Economics
- 6 - Applied Economics Requirement^4 or
- 3 - Applied Economics Requirement^4 and
- 3 - Minor Requirement
- 3 - Internship, Creative Inquiry or Directed Research Requirement^6

**15**

#### Second Semester
- 3 - ENR 4500 Conservation Issues
- 6 - Applied Economics Requirement^4
- 3 - Community Development Requirement^2
- 3 - Elective or
- 3 - Minor Requirement

**15**

**120 Total Semester Hours**

### College of Agriculture, Forestry and Life Sciences

**52**

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**NATURAL RESOURCE AND ECONOMIC POLICY CONCENTRATION**

### Sophomore Year
#### First Semester
- 3 - APEC 2570 Natural Resources, Environment and Economics or
- 3 - ECON 2110 Principles of Microeconomics
- 3 - POSC 1010 American National Government or
- 3 - POSC 1020 Intro. to International Relations
- 3 - Geography Requirement^1
- 3 - Natural Science Requirement^1
- 3 - Elective

**15**

#### Second Semester
- 3 - APEC (CRD) 3570 Natural Res. Economics
- 3 - ECON 2120 Principles of Macroeconomics
- 3 - Arts and Humanities (Literature) Requirement^1
- 3 - Arts and Humanities (Non-Lit.) Requirement^1
- 3 - Elective

**15**

### Second Semester
- 3 - ENR 3020 Natural Resource Measurements
- 3 - FOR 2060 Forest Ecology
- 3 - WFB 4500 Principles of Fish and Wildlife Biology
- 3 - Arts and Humanities (Non-Lit.) Requirement^1
- 3 - Social Science Requirement^1

**15**

### Junior Year
#### First Semester
- 3 - APEC 2570 Natural Resources, Environment and Economics or
- 3 - ECON 2110 Principles of Microeconomics
- 4 - BIOL 3200 Field Botany or
- 3 - BIOL 4060 Intro. Plant Taxonomy and
- 1 - BIOL 4070 Plant Taxonomy Lab.
- 3 - ENR 4290 Environmental Law and Policy or
- 3 - FOR 4000 Public Relations in Natural Res.
- 3 - Minor Requirement^2

**16**

#### Second Semester
- 3 - CRD (APEC) 3570 Natural Res. Economics
- 3 - GEOL 1010 Physical Geology
- 3 - GEOL 1030 Physical Geology Lab.
- 3 - WFB (BIOL) 3130 Conservation Biology
- 3 - Minor Requirement^2

**16**

### Senior Year
#### First Semester
- 3 - FOR (ENR) 4160 Forest Policy and Admin.
- 3 - FOR (ENR) 4340 GIS for Landscape Planning
- 3 - Internship, Creative Inquiry or Directed Research Requirement^6
- 3 - Minor Requirement^2
- 3 - Elective

**15**

#### Second Semester
- 3 - ENR 4500 Conservation Issues
- 3 - ENGL 3140 Technical Writing
- 2 - FOR 4060 Forested Watershed Management
- 1 - FOR 4980 Senior Portfolio
- 3 - WFB 4980 Senior Portfolio
- 3 - WFB 4620 Wetland Wildlife Biology
- 3 - Minor Requirement^2

**15**

**122 Total Semester Hours**

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

**^2GEOL 1060, GEOL 1080, or PHYS 2400**

**^2AGM 3010, BIOL 3020/3060, 3030/3070, 3040/3080, 3050/3090, 3200, 4060/4070, 4100/4110, 4170, 4420, 4640, 4680, 4720, 4770, 4860, CSEN 4040, ENT (BIOL) 3100, BIOL, WFB 4690, FOR 2510, 4060, GEOL 1120, 1140, 2100, 2400, 4030, MCR 4030, WFB 3000, 4180, 4400, 4620 or 4760. At least four of the courses must be laboratories or courses with a required laboratory component.**

**^1BIOI 4410, 4420, 4430, 4460, 4700, or WFB 4660**

**^1APEC 4330, 4750, CRD (APEC) 3570, or FOR 3040**

**^1AVS 1010, BIOL 4020/4020, 4580, 4750, or AVS 4800**

**^1ENR 4290, FOR 4000, (ENR) 4160, or WFB 4300**

**Internship (FNFR 4900), Creative Inquiry (FNFR 4700), Directed Research (FNFR 4630), or Senior Honors Thesis (FNFR 4910).**

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**NATURAL RESOURCES MANAGEMENT CONCENTRATION**

### Sophomore Year
#### First Semester
- 4 - FNR 2040 Soil Information Systems or
- 4 - CSEN 2020 Soils
- 2 - FOR 2050 Dendrology
- 3 - WFB 3000 Wildlife Biology
- 3 - Arts and Humanities (Literature) Requirement^1

**15**

#### Second Semester
- 3 - ENR 3020 Natural Resource Measurements
- 3 - FOR 2060 Forest Ecology
- 3 - WFB 4500 Principles of Fish and Wildlife Biol.
- 3 - Arts and Humanities (Non-Lit.) Requirement^1
- 3 - Social Science Requirement^1

**15**

#### Junior Year
#### First Semester
- 3 - APEC 2570 Natural Resources, Environment and Economics or
- 3 - ECON 2110 Principles of Microeconomics
- 3 - ENR 4290 Environmental Law and Policy
- 3 - Advanced Writing Requirement^2
- 3 - Applied Economics Requirement^4
- 3 - Natural Science Requirement^1

**15**

#### Second Semester
- 3 - APEC 4750 Wildlife Economics
- 3 - ENSP 4000 Studies in Environmental Science
- 3 - EXST 4620 Statistics Applied to Economics
- 3 - Macroeconomics Requirement^2
- 3 - Natural Science Requirement^1

**15**

#### Senior Year
#### First Semester
- 3 - APEC 4570 Natural Resource Use, Technology, and Policy
- 3 - ECON 3190 Environmental Economics
- 6 - Applied Economics Requirement^4 or
- 3 - Applied Economics Requirement^4 and
- 3 - Minor Requirement
- 3 - Internship, Creative Inquiry or Directed Research Requirement^6

**15**

#### Second Semester
- 3 - ENR 4500 Conservation Issues
- 6 - Applied Economics Requirement^4
- 3 - Community Development Requirement^2
- 3 - Elective or
- 3 - Minor Requirement

**15**

**120 Total Semester Hours**

**^3See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)**

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

**Internship (FNFR 4900), Creative Inquiry (FNFR 4700), or Directed Research (WFB 4630 or FNFR 4910).**
### 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/fnps.

### 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 Public Speaking
- 1 - FDSC 1010 Epochs in Man’s Struggle for Food
- 3 - MTHS 1020 Intro. to Math. Analysis or
- 4 - MTHS 1060 Calculus of One Variable I

**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 4010 Perspectives in Food and Nutrition Sciences
- 1 - FDSC 4500 Creative Inquiry
- 3 - PSYC 2010 Introduction to Psychology

**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) Requirement¹
- 2 - Social Science Requirement¹⁻²

**Second Semester**
- 3 - BCHM 3050 Essential Elements of Biochem.
- 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.) Requirement¹
- 2 - Elective

**Junior Year**

**First Semester**
- 1 - FDSC 3010 Food Regulations and Policy
- 1 - FDSC 4170 Seminar
- 1 - FDSC 4500 Creative Inquiry
- 4 - MIRC 3050 General Microbiology
- 3 - NUTR 4510 Human Nutrition
- 3 - Departmental Requirement³
- 2 - Emphasis Area Requirement⁶

**Second Semester**
- 3 - ENGL 3040 Technical 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 - MIRC 4070 Food and Dairy Microbiology
- 3 - Emphasis Area Requirement⁶

**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 Requirement⁶

**Second Semester**
- 3 - FDSC 4020 Food Chemistry II
- 4 - FDSC 4080 Food Process Engineering
- 3 - FDSC (PKSC) 4090 Total Quality Mgt. for the Food and Packaging Industries
- 1 - FDSC 4500 Creative Inquiry
- 3 - Emphasis Area Requirement⁶

**Sophomore 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 1010 Epochs in Man’s Struggle for Food
- 3 - MTHS 1020 Intro. to Math. Analysis or
- 4 - MTHS 1060 Calculus of One Variable I

**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 Psychology¹

**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 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.

**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) Requirement¹
- 3 - Arts and Humanities (Non-Lit.) Requirement¹

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¹See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
²For students undecided on concentration area, APEC 2020, ECON 2110, or 2120 is recommended.
³FDSC 4500 or AVS 4130
⁴See advisor.

### 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 1010 Epochs in Man’s Struggle for Food
- 3 - MTHS 1020 Intro. to Math. Analysis or
- 4 - MTHS 1060 Calculus of One Variable I

**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 Psychology¹

**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 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.
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 - FOR 2540 Forest Products
| 2 - FOR 2520 Forest Operations
| 3 - FOR 2510 Forest Communities
| 1 - FOR 2210 Forestry Summer Camp
| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

**Second Semester**

| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 15

**Junior Year**

| First Semester | 2 - FOR 3020 Forest Biometrics
| 3 - FOR 3040 Forest Resource Economics
| 3 - FOR 3410 Forest Resource Economics
| 4 - FOR 4130 Integrated Forest Pest Management
| 3 - FOR 4100 Harvesting Processes
| 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
| 16

**Senior Year**

| First Semester | 2 - FOR 3020 Forest Biometrics
| 3 - FOR 3040 Forest Resource Economics
| 3 - FOR 3410 Forest Resource Economics
| 4 - FOR 4130 Integrated Forest Pest Management
| 3 - FOR 4100 Harvesting Processes
| 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
| 16

**Second Semester**

| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

**Second Semester**

| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

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**FOREST RESOURCE MANAGEMENT**

**Bachelor of Science**

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

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

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**LAND SURVEYING EMPHASIS AREA**

**Freshman Year**

| First Semester | 3 - FOR 3020 Forest Biometrics
| 3 - FOR 3040 Forest Resource Economics
| 4 - FOR 4130 Integrated Forest Pest Management
| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

**Second Semester**

| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

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**Second Semester**

| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

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**Junior Year**

| First Semester | 2 - FOR 3020 Forest Biometrics
| 3 - FOR 3040 Forest Resource Economics
| 3 - FOR 3410 Forest Resource Economics
| 4 - FOR 4130 Integrated Forest Pest Management
| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

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**Second Semester**

| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

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**FINISHING TouchES**

**Senior Year**

| First Semester | 2 - FOR 3020 Forest Biometrics
| 3 - FOR 3040 Forest Resource Economics
| 3 - FOR 3410 Forest Resource Economics
| 4 - FOR 4130 Integrated Forest Pest Management
| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16

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**Second Semester**

| 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
| 6 - Minor Requirement
| 1 - Internship, Creative Inquiry or Directed Research Requirement
| 16
### 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
- 3: ENGL 3140 Technical Writing
- 3: FOR 2060 Forestry Ecology
- 3: Arts and Humanities (Non-Lit.) Requirement
- 3: Social Science Requirement
- 14

### 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: FOR (ENR) 4340 GIS for Landscape Planning
- 15

#### Second Semester
- 3: 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 4010 Harvesting Processes
- 3: FOR (ENR) 4160 Forest Policy and Admin.
- 3: FOR 4170 Forest Resource Mgt. and Regulation
- 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

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### Second Semester
#### First 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

#### 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
- 3: Elective
- 14

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

#### Senior Year
#### First Semester
- 3: GEN 4500 Comparative Genetics
- 3: Science Requirement
- 3: Social Science Requirement
- 3: Arts and Humanities (Literature) Requirement
- 6: Elective
- 15

#### Second Semester
- 2: GEN 4930 Senior Seminar
- 6: Genetics Requirement
- 3: Science Requirement
- 4: Elective
- 15

123 Total Semester Hours

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1. Medical, veterinary, and graduate school requirements often include two semesters of physics with calculus and the physics laboratory. Students are encouraged to check requirements for admission to professional postgraduate programs.
2. See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.
3. Some courses are prerequisite to professional postgraduate programs.
4. Two semesters of a foreign language are recommended.
5. AVS 4700, BCHM 4310, 4320, 4330, 4410, 4430, 4450, 4910, BIOL 3350, 4400, 4500, PLPA, 4540, 4560, 4570, CSEN 4050, GEN 4700, 4910, MICR 3050, 4510, 4710
6. A minimum grade of C is required in all science and mathematics courses. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any science or mathematics course.
HORTICULTURE

Bachelor of Science

Horticulture connects plants and people to improve our world, be it through the enhancement of the foods we eat, the creation of healthy natural living spaces, the economic and aesthetic enhancement of our homes and communities, or the application of green solutions to the challenges of environmental quality. The plants of horticulture are the foundation of human and environmental well being, and it is horticulture professionals who have the knowledge, skills, and passion to utilize those plants for the betterment of humankind.

The Horticulture degree program includes courses in science, mathematics, business, leadership, law, and communication, combined with a strong foundation in horticultural sciences and arts. The curriculum provides the flexibility to choose courses within those categories that best support the student’s personal interests, goals, and success. Career opportunities are endless.

Students work closely with faculty in creative inquiry groups to investigate and implement solutions to real problems. Internships are excellent opportunities to learn and explore potential careers.

Freshman Year

First Semester
3 - BIOL 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
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 - MTHS 1020 Intro. to Mathematical Analysis
3 - Business Requirement
1
16

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
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
3 - Social Science Requirement
1
13

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

Junior Year

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

Senior Year

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

Second Semester
3 - Horticulture Specialization Requirement
6 - Related Science Requirement
2 - Elective
11

120 Total Semester Hours

See advisor. Select from department-approved list.
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 3030. Prior approval is required for internships, and a 2.0 grade-point average is required for registration.

Note: Horticulture 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 unicellular algae. Microbiologists seek to describe these organisms in terms of their structures, functions, and processes of reproduction, growth, and death at both the cellular and molecular levels. They are also concerned with their ecology, particularly in regard to their pathologial 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
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
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Mathematical Sciences Requirement
3 - Elective
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 - Social Science Requirement
3 - Elective
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
3 - Biochemistry Requirement
4 - General Microbiology Requirement
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. 1
6 - Microbiology Requirement
3 - Elective
16

Second Semester
3 - MICR 4120 Bacterial Physiology
2 - MICR 4500 Advanced Micro Lab I
3 - Microbiology Requirement
3 - Social Science Requirement
3 - Elective
14
Senior Year
First Semester
3 - BIOL 4610 Cell Biology
3 - MICR 4150 Microbial Genetics
2 - MICR 4510 Advanced Micro Lab II
3 - Virology Requirement9
3 - Elective4 14

Second Semester
2 - MICR 4520 Advanced Micro Lab III
2 - MICR 4930 Senior Seminar
3 - Microbiology Requirement7
9 - Elective4 16

124–125 Total Semester Hours
1BIOL 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 credits required must be completed by taking 1-2 extra credits from departmental course offerings at the 3000 level or above. See advisor.
2MTHS 1110, 2030, 3010, or EXST 3101, or other approved coursework. See advisor. Medical and dental schools have different mathematics requirements.
3See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.
4Elective hours may be used toward satisfying the requirements of a minor.
5BCHM 3010 or 3050, or other approved coursework at the 2000 level or higher.
6MICR 3050 or other approved coursework at the 2000 level or higher.
7See advisor. Minimum of 12 credits is required. At least one course must be selected from each of the following fields: Biomedicine—BIOL 3150, 4200, 4340, 4560/4570, 4670, 4840, 4890; GEN 3000, HLTH 3800, MICR 4000, 4110, IAWS, BIOL 4140, 4170
8Environmental—BIL (PLPA) 4250, MICR 4020, 4030, 4100
9Food Safety, Industrial, and Technology—BIOL 4870, MICR 4070, 4130
Students planning to apply to medical/dental schools should take PHYS 2080 and 2100 during the second semester of the junior year.
10BIOL 4540 or MICR 4160

Sophomore Year
First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
3 - ENGL 3150 Scientific Writing and Comm.
1 - Arts and Humanities (Literature) Requirement5
3 - Social Science Requirement5
1 - Elective4

Second Semester
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
3 - Arts and Humanities (Non-Lit.) Requirement5
3 - Biochemistry Requirement5
3 - Biomedicine Requirement8
4 - General Microbiology Requirement2

Junior Year
First Semester
3 - BIOL 4610 Cell Biology
2 - MICR 4620 Cell Biology Lab.
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
3 - Genetics Requirement5

Second Semester
3 - MICR 4120 Bacterial Physiology
2 - MICR 4500 Advanced Micro Lab I
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 - Social Science Requirement5
3 - Elective4

Senior Year
First Semester
3 - MICR 4140 Basic Immunology
3 - MICR 4150 Microbial Genetics
3 - MICR 4160 Introductory Virology
2 - MICR 4510 Advanced Micro Lab II
3 - Biomedicine Requirement8
14

Second Semester
3 - MICR 4170 Pathogenic Bacteriology
3 - MICR 4170 Molecular Mechanisms of Carcinogenesis and Aging
2 - MICR 4520 Advanced Micro Lab III
2 - MICR 4930 Senior Seminar
3 - Biomedicine Requirement8
3 - Elective4 16

125–126 Total Semester Hours
3MTHS 1110, 2030, 3010, or EXST 3010, or other approved coursework. See advisor. Medical and dental schools have different mathematics requirements.
4See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.
5Elective hours may be used toward satisfying the requirements of a minor.
6BCHM 3010 or 3050, or other approved coursework at the 2000 level or higher.
7See advisor. Minimum 9 hours required. BCHM 4230, 4320, BIOL 3150, 4200, (PLPA) 4250, 4340, 4560, 4570, 4670, 4840, 4890, HLTH 3800, MICR 4000 or 4910.
8MICR 3050 or other approved coursework at the 2000 level or higher.
9GEN 3000 or 3020, or other approved coursework.

BIOMEDICINE CONCENTRATION
Freshman Year
First Semester
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 - MICR 1010 Microbes and Human Affairs
4 - MTHS 1060 Calculus of One Variable I
17

Second Semester
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Mathematical Sciences Requirement
15-16

Second Semester
5 - BIOL 1110 Principles of Biology II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
3 - Mathematical Sciences Requirement
15-16

Junior Year
First Semester
3 - BIOL 1050 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
4 - MTHS 1060 Calculus of One Variable I
1 - PKSC 1010 Packaging Orientation
3 - Social Science Requirement
16

Second Semester
3 - Elective
3 - Elective
4 - ENGL 3150 Scientific Writing and Comm.
3 - Arts and Humanities (Literature) Requirement
3 - Social Science Requirement
3 - Elective

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

Second Semester
3 - CH 2240 Organic Chemistry
1 - CH 2280 Organic Chemistry Lab.
3 - Arts and Humanities (Non-Lit.) Requirement
3 - Biochemistry Requirement
3 - Biomedicine Requirement
4 - General Microbiology Requirement

Junior Year
First Semester
3 - BIOL 4610 Cell Biology
2 - MICR 4620 Cell Biology Lab.
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
3 - Genetics Requirement

Second Semester
3 - MICR 4120 Bacterial Physiology
2 - MICR 4500 Advanced Micro Lab I
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 - Social Science Requirement
3 - Elective

Senior Year
First Semester
3 - MICR 4140 Basic Immunology
3 - MICR 4150 Microbial Genetics
3 - MICR 4160 Introductory Virology
2 - MICR 4510 Advanced Micro Lab II
3 - Biomedicine Requirement

Second Semester
3 - MICR 4170 Pathogenic Bacteriology
3 - MICR 4170 Molecular Mechanisms of Carcinogenesis and Aging
2 - MICR 4520 Advanced Micro Lab III
2 - MICR 4930 Senior Seminar
3 - Biomedicine Requirement
3 - Elective

125–126 Total Semester Hours
3MTHS 1110, 2030, 3010, or EXST 3010, or other approved coursework. See advisor. Medical and dental schools have different mathematics requirements.
4See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.
5Elective hours may be used toward satisfying the requirements of a minor.
6BCHM 3010 or 3050, or other approved coursework at the 2000 level or higher.
7See advisor. Minimum 9 hours required. BCHM 4230, 4320, BIOL 3150, 4200, (PLPA) 4250, 4340, 4560, 4570, 4670, 4840, 4890, HLTH 3800, MICR 4000 or 4910.
8MICR 3050 or other approved coursework at the 2000 level or higher.
9GEN 3000 or 3020, or other approved coursework.

PACKAGING SCIENCE
Bachelor of Science
The Bachelor of Science degree in Packaging Science prepares students for careers in industries producing and utilizing packages for all types of products. Packaging is an essential part of industrialized economies, protecting, preserving, and helping to market products. The field of packaging is highly competitive and highly innovative, requiring an ever-increasing number of professional positions.

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

The core curriculum assures graduates of having the skills and knowledge required by most entry-level packaging positions. Emphasis area choices 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/tnps.
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 Science

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

Second Semester
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 - PKSC 2010 Packaging Perishable Products
3 - PKSC 2040 Container Systems
1 - PKSC 2060 Container Systems
3 - Arts and Humanities (Non-Lit.) Requirement

Summer
0 - COOP 1010 Cooperative Education

Junior Year
First Semester
3 - ENGL 3140 Technical Writing
4 - GC 1030 Graphic Comm. I for Packaging Sci.
3 - PKSC 4040 Mechanical Properties of Packages and Principles of Protective Packaging
1 - PKSC 4540 Product and Package Eval. Lab.
3 - Emphasis Area Requirement

Second Semester
3 - PKSC 3200 Package Design Fundamentals
3 - PKSC 3680 Packaging and Society
3 - PKSC 4010 Packaging Machinery
3 - PKSC 4300 Converting for Flexible Packaging
3 - PKSC 4400 Packaging for Distribution
3 - Emphasis Area Requirement

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 Requirement

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
3 - Arts and Humanities (Non-Lit.) Requirement
6 - Emphasis Area Requirement

124 Total Semester Hours

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

PREPROFESSIONAL HEALTH STUDIES
Non-degree
The health professions need individuals with a diversity of educational backgrounds and a wide variety of talents and interests. The philosophies of education, the specific preprofessional course requirements, the noncognitive qualifications for enrollment, and the systems of training vary among the professional health schools; but all recognize the desirability of a broad education—a good foundation in the natural sciences, highly developed communication skills, and a solid background in the humanities and social sciences. The absolute requirements for admission to professional health schools are limited to allow latitude for developing individualized undergraduate programs of study; however, most schools require 16 semester hours of chemistry, including organic chemistry, eight hours of biological sciences, eight hours of physics, and six hours of mathematics. These requirements should be balanced with courses in vocabulary building, the humanities, and social sciences. The basic requirements in the natural sciences and as many of the courses in the humanities and social sciences as possible should be completed by the third year so students are prepared to take the Dental Admission Test or the Medical College Admission Test prior to applying to a professional school.

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

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

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

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

First Year
First Semester
3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
4 - MTHS 1060 Calculus of One Variable I
3 - PSYC 2010 Introduction to Psychology
3 - Arts and Humanities (Non-Lit.) Requirement

Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1030 General Chemistry
3 - ECON 2000 Economic Concepts
3 - ENGL 1030 Accelerated Composition
3 - EXST 3010 Introductory Statistics
1 - Elective
## Second Year
### First Semester
1. BIOL 2220 Human Anatomy and Phys. I
2. CH 2230 Organic Chemistry
3. PHYS 2070 General Physics I
4. CH 2270 Organic Chemistry Lab.
5. BIOL 2220 Human Anatomy and Phys. I Lab.
6. Arts and Humanities (Literature) Requirement
7. History or Philosophy Requirement

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## Third Year
### First Semester
1. BIOL 1030 General Biology I
2. BIOL 1050 General Biology Lab. I
3. CH 1010 General Chemistry
4. PSYC 2010 Introduction to Psychology
5. Arts and Humanities (Non-Lit.) Requirement
7. History or Philosophy Requirement

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### Second Semester
1. BIOL 1040 General Biology II
2. BIOL 1060 General Biology Lab. II
3. CH 1020 General Chemistry
4. ENGL 1030 Accelerated Composition
5. EXST 3010 Introductory Statistics
6. SOC 2010 Introduction to Sociology
7. Elective

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## Fourth Year
### First Semester
1. BIOL 1030 General Biology I
2. BIOL 1050 General Biology Lab. I
3. CH 1010 General Chemistry
4. PSYC 2010 Introduction to Psychology
5. Arts and Humanities (Non-Lit.) Requirement

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### Second Semester
1. BIOL 1040 General Biology II
2. BIOL 1060 General Biology Lab. II
3. CH 1020 General Chemistry
4. ENGL 1030 Accelerated Composition
5. EXST 3010 Introductory Statistics
6. SOC 2010 Introduction to Sociology
7. Elective

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## PREREHABILITATION SCIENCES
The Prehabilitation 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 graduate 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 Prehabilitation 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 Prehabilitation Sciences program are considered to be enrolled in a degree-seeking program.

## 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.

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

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

Students with a concentration in Sustainable Crop Production will graduate with comprehensive knowledge to increase farm profits by decreasing the costs of crop and production; build soil tilth and fertility through rotations, multiple cropping, and nutrient cycling; protect the environment by minimizing or more efficiently using synthetic agrichemicals; manage crop pests and weeds with integrated, ecologically sound strategies; develop strategies for profitable marketing of agricultural commodities; and create a strong, diversified agriculture that is stable through marketing of agricultural commodities; and create a soil science to environmental engineering and law.

Students with a concentration in Sustainable Crop Production will graduate with comprehensive knowledge to increase farm profits by decreasing the costs of crop and production; build soil tilth and fertility through rotations, multiple cropping, and nutrient cycling; protect the environment by minimizing or more efficiently using synthetic agrichemicals; manage crop pests and weeds with integrated, ecologically sound strategies; develop strategies for profitable marketing of agricultural commodities; and create a strong, diversified agriculture that is stable through marketing of agricultural commodities; and create a

Freshman Year

First Semester
5 - BIOL 1100 Principles of Biology I
4 - CH 1010 General Chemistry
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

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

1BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110.

2MTHS 1060 is recommended for students in the Agricultural Biotechnology Concentration.
3See General Education Requirements. PHIL 1030 is recommended for students in the Agricultural Biotechnology Concentration.

AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Sophomore Year

First Semester
3 - CH 2230 Organic Chemistry
1 - CH 2270 Organic Chemistry Lab.
1 - 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 - BCHM 3050 Essential Elements of Biochem.
3 - BIOL 3040 Biology of Plants
2 - BIOL 4340 Biological Chem. Lab. Tech
3 - CSEN 4220 Major World Crops
3 - SSCS 3350 Agricultural Biotechnology
2 - Social Science Requirement
17

Second Semester
1 - CSEN (SSCS) 3500 Practicum
3 - ENGL 3140 Technical Writing or
3 - ENGL 3150 Scientific Writing and Comm.
3 - PLPA 3100 Principles of Plant Pathology
1 - SSCS 4010 Academic and Professional Dev.
3 - Concentration Requirement
14

Senior Year

First Semester
3 - BIOL 4010 Plant Physiology
1 - BIOL 4020 Plant Physiology Lab.
1 - CSEN (SSCS) 3500 Practicum
4 - ENT (BIOL) 3010 Insect Biology and Diversity
1 - SSCS 4450 Regulatory Issues and Policies
1 - SSCS 4500 Agric. Biosystems and Risk Assess.
3 - Concentration Requirement
16

Second Semester
2 - CSEN (SSCS) 3500 Practicum
3 - CSEN 4090 Biology of Invasive Plants
3 - Concentration Requirement
14
122–124 Total Semester Hours

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

Sophomore Year

First Semester
3 - CH 2230 Organic Chemistry and
1 - CH 2270 Organic Chemistry Lab. or
4 - CH 2010 Survey of Organic Chemistry
4 - CSEN 2020 Soils
3 - GEOL 1010 Physical Geology
1 - GEOL 1030 Physical Geology Lab.
3 - PHYS 2070 General Physics I and
1 - PHYS 2090 General Physics I Lab. or
1 - PHYS 1220 Physics with Calculus I and
1 - PHYS 1240 Physics Lab. I
16

Second Semester
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 - Cross-Cultural Awareness Requirement
4 - Concentration Requirement
14

Junior Year

First Semester
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
1 - GEOL 1030 Physical Geology Lab.
3 - MTHS 2070 Multivariable Calculus
5 - Concentration Requirement
3 - Plant Science Requirement
15

Second Semester
3 - CSEN 4900 Beneficial Soil Organisms in Plant Growth
3 - ENGL 3140 Technical Writing or
3 - ENGL 3150 Scientific Writing and Comm.
3 - GEOL 4080 Geohydrology
1 - SSCS 4010 Academic and Professional Dev.
3 - Concentration Requirement
3 - Social Science Requirement
16

Senior Year

First Semester
3 - CSEN (SSCS) 3500 Practicum
2 - CSEN 4030 Soil Genesis and Classification
1 - CSEN 4550 Seminar
3 - Applied Spatial Technology Requirement
3 - Concentration Requirement
2 - Field Scale Environmental Mgt. Requirement
15

60
Second Semester
3 - AGR (ENSP) 3150 Environment and Agric.
3 - BIOL 4010 Plant Physiology and
1 - BIOL 4020 Plant Physiology Lab.
3 - CSEN (BE) 4080 Land Treatment of Wastewater and Sludges
3 - Concentration Requirement¹
3 - Social Science Requirement¹
16

123–125 Total Semester Hours
¹See General Education Requirements.
²Selected from department-approved list.
³CH 2230/2270, and 2240/2280 are strongly recommended. BIOL 4140, CSEN 4210, 4220, 4230, (APEC) 4260, or HORT 4560.
⁴AGM 4000, FOR 4330, or other course approved by advisor.
⁵AGM 4020, ETUC 4210, or other course approved by advisor.

SUSTAINABLE CROP PRODUCTION CONCENTRATION

Sophomore Year
First Semester
3 - APEC 2020 Agricultural Economics or
3 - ECON 2110 Principles of Microeconomics
3 - CH 2230 Organic Chemistry¹ and
1 - CH 2270 Organic Chemistry Lab.¹ or
4 - CH 2100 Survey of Organic Chemistry
3 - CSEN 2020 Soils
3 - PLPA 3100 Principles of Plant Pathology
14

Second Semester
3 - APEC 2050 Agriculture and Society
3 - CH 2240 Organic Chemistry² and
1 - CH 2280 Organic Chemistry Lab.³ or
2 - BCHM 3050 Essential Elements of Biochemistry, and
2 - BIOL 4340 Biol. Chem. Lab Techniques
3 - COMM 1500 Intro. to Human Comm. or
3 - COMM 2500 Public Speaking
3 - SSCS 3330 Agricultural Genetics
3 - Plant Science Requirement²
16–17

Summer
3 - PLPA 4110 Plant Disease Diagnosis I

Junior Year
First Semester
4 - ENT (BIOL) 3010 Insect Biology and Diversity
3 - IPM 4010 Principles of Integrated Pest Mgr.
3 - Concentration Requirement¹
3 - Plant Science Requirement²
3 - Social Science Requirement³
16

Second Semester
3 - BIOL 4010 Plant Physiology
1 - BIOL 4020 Plant Physiology Lab.
3 - CSEN 4050 Plant Breeding
3 - CSEN 4090 Biology of Invasive Plants
3 - ENGL 3140 Technical Writing or
3 - ENGL 3150 Scientific Writing and Comm.
1 - SSCS 4010 Academic and Professional Dev.
14

Senior Year
First Semester
3 - CSEN 4900 Beneficial Soil Organisms in Plant Growth
4 - ENT 4070 Applied Agricultural Entomology¹
6 - Concentration Requirement³
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) Requirement⁴
6 - Concentration Requirement³
17

124–126 Total Semester Hours
¹CH 2230/2270, and 2240/2280 are strongly recommended. BIOL 3040, CSEN 4220, 4230, HORT 3100, 4550, 4560, or other department-approved course.
²Select from department-approved list.
³See General Education Requirements.

TURFGRASS

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

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

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

Freshman Year
First Semester
4 - CH 1010 General Chemistry
3 - HORT 1010 Turficulture
3 - MTHS 1020 Intro to Math Analysis
4 - Spanish Language Requirement⁵
14

Second Semester
3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Laboratory II
4 - CH 1020 General Chemistry
3 - ENGL 1030 Accelerated Composition
1 - HORT 1020 Experience Horticulture
4 - Related Science Requirement⁶
16

Sophomore Year
First Semester
3 - HORT 2120 Introduction to Turfgrass Culture
1 - HORT 2130 Turfgrass Culture Lab.
3 - HORT 3030 Landscape Plants
3 - MTHS 1010 Essential Math for Informed Soc.
4 - Plant Biology Requirement¹
14

Second Semester
4 - CSEN 2020 Soils
3 - Arts and Humanities (Literature) Requirement⁷
3 - Business Requirement¹
3 - Related Science Requirement¹
3 - Social Science Requirement¹
16

Summer
3 - HORT 2710 Internship¹ or
3 - HORT 4710 Advanced Internship¹

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

Second Semester
3 - BIOL 4030 Plant Physiology
1 - BIOL 4020 Plant Physiology Lab.
3 - HORT 4200 Applied Turfgrass Physiology
2 - PLPA (ENT) 4060 Diseases and Insects of Turfgrasses
3 - Horticulture Specialization Requirement¹
3 - Oral Communication Requirement¹
15

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

Senior Year
First Semester
3 - HORT 4120 Advanced Turfgrass Management
3 - Business Requirement¹
3 - Horticulture Specialization Requirement¹
3 - Related Science Requirement¹
3 - Soils Requirement¹
18
### Second Semester

3 - HORT (CSEN) 4330 Landscape and Turf Management
3 - Horticulture Specialization Requirement1
3 - Related Science Requirement1
3 - Soils Requirement1

### 12

123 Total Semester Hours

1See advisor. Select from department-approved list. 
2See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements. 
1Internship 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. 
*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.

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### WILDLIFE AND FISHERIES BIOLOGY

#### Bachelor of Science

Increased interest in conservation of natural resources and the environment and demand for seafood products has resulted in these areas becoming increasingly technical and requiring highly qualified wildlife and fisheries biologists. 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 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.

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### Freshman Year

#### First Semester

3 - BIOL 1030 General Biology I
1 - BIOL 1050 General Biology Lab. I
4 - CH 1010 General Chemistry
1 - ENR 1010 Intro. to Env. and Natural Res. I
3 - MTHS 1020 Intro. to Mathematical Analysis
3 - Oral Communication Requirement1

#### Second Semester

3 - BIOL 1040 General Biology II
1 - BIOL 1060 General Biology Lab. II
4 - CH 1060 Chemistry in Context II or
4 - PHYS 2000 Introductory Physics
3 - ENGL 1030 Accelerated Composition
3 - EXST 3010 Introductory Statistics
1 - FNR 1020 FNR Freshman Portfolio

### Sophomore Year

#### First Semester

4 - FNR 2040 Soil Information Systems
2 - FOR 2050 Dendrology
3 - WFB 3000 Wildlife Biology
1 - WFB 3010 Wildlife Biology Lab.
3 - Arts and Humanities (Non-Lit.) Requirement1

#### Second Semester

3 - ENGL 3140 Technical Writing
3 - FOR 2080 Forestry Ecology
3 - GEN 3000 Fundamental Genetics
3 - WFB 3500 Principles of Fish and Wildlife Biol.
3 - Social Science Requirement1

### Junior Year

#### First Semester

3 - BIOL 3030 Vertebrate Biology
4 - BIOL 3200 Field Botany
3 - WFB 4060 Wildlife Management Techniques
3 - Approved Requirement2
3 - Arts and Humanities (Literature) Requirement1

#### Second Semester

3 - WFB 4100 Wildlife Management Techniques
3 - WFB 4140 Non-Game Wildlife Management
3 - WFB 4170 Wildlife Conservation Policy
1 - FNR 4990 Natural Resources Seminar

### Senior Year

#### First Semester

3 - APEC 2570 Natural Resources, Environment, and Economics
4 - AVS 3010 Anat. and Phys. of Domestic Animals
3 - FOR (ENR) 4340 GIS for Landscape Planning
1 - WFB 4980 Senior Portfolio
3 - Approved Requirement1

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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.