

# COLLEGE OF AGRICULTURE, FORESTRY, AND LIFE SCIENCES

The College of Agriculture, Forestry, and Life Sciences ([virtual.clemson.edu/groups/CAFLS/](http://virtual.clemson.edu/groups/CAFLS/)) offers a broad range of academic degree programs providing a sound knowledge base and technical expertise in the basic and applied sciences including the life sciences. The Bachelor of Science degree is available in 16 academic programs; the Bachelor of Arts is offered in Biological Sciences.

Preprofessional Health Studies non-degree programs are offered in Premedicine, Prepharmacy, Prehabilitation Sciences, and Preveterinary Medicine. A bachelor's degree can be obtained by fulfilling additional requirements specified by the University.

The undergraduate academic programs include Agricultural and Applied Economics with a Community and Economic Development Concentration; Agricultural Education; Agricultural Mechanization and Business; Animal and Veterinary Sciences with concentrations in Animal Agribusiness, Equine Business, and Preveterinary and Science; Biochemistry; Biological Sciences; Biosystems Engineering; Environmental and Natural Resources with concentrations in Conservation Biology, Natural Resource and Economic Policy, and Natural Resources Management; Food Science with concentrations in Food Science and Technology and Nutrition and Dietetics; Forest Resource Management; Genetics; Horticulture; Microbiology with a Biomedicine Concentration; Packaging Science; Turfgrass; and Wildlife and Fisheries Biology.

Minors are available to students who wish to broaden their educational background and enhance their expertise. (See page 55 for acceptable minors.)

## Scholarships

A range of scholarships is available to students who excel in their academic performance. Information on scholarships and financial aid can be obtained from specific departments in the College or from the Student Financial Office in Sikes Hall.

## Student Services

The college has a comprehensive Student Service Center offering a career library, company literature, career search technology, and video/audio resources.

## AGRICULTURAL AND APPLIED ECONOMICS

### Bachelor of Science

The Agricultural and Applied Economics curriculum emphasizes a strong background in economics with applications to production agriculture, agribusiness, natural resources, and the environment. Courses are also included in basic agricultural and biological sciences, liberal arts, and business.

Employment opportunities for graduates in Agricultural and Applied Economics are many and diverse. Private sector opportunities include agricultural production, banking, finance, marketing, and public relations. Public sector opportunities include national/local organizations, government agencies, educational institutions, and cooperative extension services. Graduates have also begun businesses or returned to family-owned businesses. This major also provides an excellent background for professional or graduate study in several disciplines.

Students in the Agricultural and Applied Economics curriculum take a basic set of courses during the freshman and sophomore years. During the junior and senior years, students concentrate in one of five emphasis areas: Agricultural Business, Economics, International Trade and Development, Production, and Real Estate. Students should select an emphasis area by the end of the sophomore year.

### Freshman Year

#### First Semester

- 3 - AP EC 205 Agriculture and Society
  - 2 - C U 101 University Success Skills
  - 3 - COMM 150 Intro. to Human Communication
  - 3 - MTHSC 102 Intro. to Mathematical Analysis
  - 4 - Natural Science Requirement<sup>1</sup>
- 15

#### Second Semester

- 3 - AP EC 202 Agricultural Economics
  - 3 - CP SC 120 Intro. to Information Technology
  - 3 - ENGL 103 Accelerated Composition
  - 3 - EX ST 222 Statistics in Everyday Life
  - 3 - PHIL 103 Introduction to Ethics
- 15

### Sophomore Year

#### First Semester

- 3 - ACCT 201 Financial Accounting Concepts
  - 3 - AP EC 308 Quantitative Applied Economics
  - 3 - COMM 250 Public Speaking
  - 3 - ECON 212 Principles of Macroeconomics
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 15

#### Second Semester

- 3 - ACCT 202 Managerial Accounting Concepts
  - 3 - AP EC 302 Economics of Farm Management
  - 3 - EX ST 301 Introductory Statistics
  - 3 - SOC 201 Introduction to Sociology
  - 3 - Agriculture or Business Requirement<sup>2</sup>
- 15

### Junior Year

#### First Semester

- 3 - AP EC 309 Econ. of Agricultural Marketing
  - 3 - ECON (MGT) 306 Managerial Economics *or*  
3 - ECON 314 Intermediate Microeconomics
  - 3 - ENGL 304 Business Writing *or*  
3 - ENGL 314 Technical Writing
  - 3 - MGT 201 Principles of Management
  - 3 - MKT 301 Principles of Marketing
- 15

#### Second Semester

- 3 - AP EC 319 Agribusiness Management
  - 3 - AP EC 421 Globalization *or*  
3 - AP EC 460 Agricultural Finance
  - 3 - C R D 335 Leadership in Org. and Comm.
  - 3 - COMM 350 Small Group and Team Comm. *or*  
3 - COMM 364 Organizational Comm. *or*  
3 - COMM 367 Negotiations Communication
  - 3 - ECON 302 Money and Banking *or*  
3 - ECON 315 Intermediate Macroeconomics
- 15

### Senior Year

#### First Semester

- 3 - AP EC 402 Production Economics
  - 3 - AP EC 452 Agricultural Policy
  - 3 - CSENV (AP EC) 426 Cropping Syst. Analysis
  - 3 - EX ST 462 Statistics Applied to Economics
  - 3 - MGT 307 Personnel Management
- 15

#### Second Semester

- 3 - AP EC 456 Prices
  - 3 - LAW 322 Legal Environment of Business
  - 8 - Agriculture or Business Requirement<sup>2</sup>
  - 1 - Elective
- 15

120 Total Semester Hours

<sup>1</sup>See General Education Requirements.

<sup>2</sup>See advisor.

## COMMUNITY AND ECONOMIC DEVELOPMENT CONCENTRATION

The program in Community and Economic Development provides career opportunities for social science administration, management, outreach, and research. A Bachelor of Science degree in Agricultural and Applied Economics with a concentration in Community and Economic Development facilitates employment with local, state, regional, federal, and international agencies; research and consulting firms; financial institutions; foundations and councils; public and private utilities; and organizations requiring entrepreneurial skills. This major provides an excellent background for professional and graduate study in several disciplines.

Associations between natural resources and social, economic, and political institutions are investigated. The Community and Economic Development program provides the conceptual, analytical, and pragmatic qualifications to succeed as economic development specialists. Students receive practical training, and internships are available to complement coursework.

**Freshman Year****First Semester**

- 3 - CP SC 120 Intro. to Information Technology
  - 3 - MTHSC 102 Intro. to Mathematical Analysis
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Science and Tech. in Society Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 15

**Second Semester**

- 3 - ACCT 201 Financial Accounting Concepts
  - 3 - ENGL 103 Accelerated Composition
  - 4 - Natural Science Requirement<sup>1</sup>
  - 5 - Elective
- 
- 15

**Sophomore Year****First Semester**

- 3 - EX ST 301 Introductory Statistics
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Microeconomics Requirement<sup>3</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
  - 3 - Elective
- 
- 15

**Second Semester**

- 3 - C R D 357 Natural Resources Economics
  - 3 - ECON 212 Principles of Macroeconomics
  - 3 - PO SC 302 State and Local Government
  - 3 - Advanced Writing Requirement<sup>1</sup>
  - 3 - Behavioral Science Requirement<sup>4</sup>
- 
- 15

**Junior Year****First Semester**

- 3 - C R D 335 Leadership in Org. and Commun.
  - 3 - ECON (MGT) 306 Managerial Economics *or*  
3 - ECON 314 Intermediate Microeconomics
  - 3 - Behavioral Science Requirement<sup>4</sup>
  - 3 - Emphasis Area<sup>5</sup>
  - 3 - Marketing Requirement<sup>6</sup>
- 
- 15

**Second Semester**

- 3 - AP EC 352 Public Finance
  - 3 - C R D 336 Community Development Methods
  - 3 - Behavioral Science Requirement<sup>4</sup>
  - 3 - Emphasis Area<sup>5</sup>
  - 3 - Planning Requirement<sup>5</sup>
- 
- 15

**Senior Year****First Semester**

- 3 - C R D (AP EC) 411 Regional Impact Analysis
  - 3 - EX ST 462 Statistics Applied to Economics
  - 3 - R S (SOC) 459 The Community
  - 6 - Emphasis Area<sup>5</sup>
- 
- 15

**Second Semester**

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

120 Total Semester Hours

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

<sup>2</sup>PO SC 101, 102, or SOC 201

<sup>3</sup>AP EC 202, 257, or ECON 211

<sup>4</sup>Select from 300–400-level courses in ANTH, APEC, C R D, C R P, ECON, MGT, MKT, PO SC, PSYCH, or SOC.

<sup>5</sup>See advisor.

<sup>6</sup>AP EC 309, 351, or MKT 301

<sup>7</sup>AP EC 490, C R D (AP EC) 491, or 492

**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 55.)

The Bachelor's degree prepares students for professional education positions in the mainstream of agriculture including teaching, cooperative extension service, and government agricultural agencies. The Agricultural Education degree also prepares students for other educational work such as agricultural missionary, public relations, and training officers in agricultural industry.

**Freshman Year****First Semester**

- 1 - AG ED 102 Agric. Ed. Freshman Seminar
  - 3 - AG ED 200 Agricultural Applications of Educational Technology
  - 4 - BIOL 103 General Biology I
  - 3 - PHIL 102 Introduction to Logic
  - 2 - Emphasis Area<sup>1</sup>
  - 3-4 - Mathematics Requirement<sup>2</sup>
- 
- 16-17

**Second Semester**

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

**Sophomore Year****First Semester**

- 3 - AG ED 201 Intro. to Agricultural Education
  - 3 - AG ED 204 Applied Agriculture Calculations
  - 3 - AG ED 355 Team and Organizational Leadership in Food and Fiber Systems
  - 3 - AP EC 202 Agricultural Economics
  - 4 - CH 105 Beginning Gen. and Organic Chem.
- 
- 16

**Second Semester**

- 3 - AG ED 203 Teaching Agriscience
  - 3 - AG M 205 Principles of Fabrication
  - 4 - CH 106 Beginning Gen. and Organic Chem.
  - 3 - HORT 212 Introduction to Turfgrass Culture
  - 1 - HORT 213 Turfgrass Culture Lab.
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 
- 17

**Junior Year****First Semester**

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

**Second Semester**

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

**Senior Year****First Semester**

- 3 - AG ED 401 Instructional Methods in Ag. Ed.
  - 3 - AG ED 404 Biotechnology in Agricultural Ed.
  - 6 - Emphasis Area<sup>1</sup>
- 
- 12

**Second Semester**

- 12 - AG ED 406 Directed Teaching
  - 2 - Emphasis Area<sup>1</sup>
- 
- 14

124–125 Total Semester Hours

<sup>1</sup>See advisor. Select one of the following emphasis areas by the end of the sophomore year: Teacher Certification, Leadership, Communication.

<sup>2</sup>MTHSC 101, 102, 106, 108, 203, or 207

<sup>3</sup>See General Education Requirements.

**AGRICULTURAL MECHANIZATION AND BUSINESS****Bachelor of Science**

The Agricultural Mechanization and Business major provides a program for students who desire training in areas relevant to dynamic agricultural enterprise. The program is organized with strength in both business management and technical support of agriculture and agribusiness. To produce well rounded individuals with good communication skills, the curriculum includes courses in the humanities, social sciences, English composition, and public speaking.

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

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

Additional information is available from the departmental offices or can be found at [www.clemson.edu/agbioeng/agmech/index.htm](http://www.clemson.edu/agbioeng/agmech/index.htm).

## Freshman Year

### First Semester

- 3 - AG ED 200 Agricultural Applications of Educational Technology
  - 1 - AG M 101 Intro. to Ag. Mech. and Business
  - 4 - BIOL 103 General Biology I
  - 4 - CH 105 Beginning Gen. and Organic Chem.
  - 3 - MTHSC 102 Intro. to Mathematical Analysis
- 
- 15

### Second Semester

- 4 - BIOL 104 General Biology II
  - 4 - CH 106 Beginning Gen. and Organic Chem.
  - 3 - ENGL 103 Accelerated Composition
  - 3 - EX ST 301 Introductory Statistics
  - 1 - Elective
- 
- 15

## Sophomore Year

### First Semester

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

### Second Semester

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

## Junior Year

### First Semester

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

### Second Semester

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

## Senior Year

### First Semester

- 3 - AG M 402 Drainage, Irrig. and Waste Mgt.
  - 3 - AP EC 319 Agribusiness Management
  - 3 - Agriculture Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>4</sup>
- 
- 12

## Second Semester

- 3 - AG M 405 Agricultural Structures and Environmental Control
  - 3 - AG M 410 Precision Agriculture Technology
  - 3 - AG M 452 Mobile Power
  - 3 - AG M 472 Capstone
  - 3 - Minor Requirement<sup>2</sup>
- 
- 15
- 121 Total Semester Hours

<sup>1</sup>See General Education Requirements.

<sup>2</sup>See Agricultural Business Management minor or select other approved minor.

<sup>3</sup>See advisor.

<sup>4</sup>See General Education Requirements. This course must also satisfy the Cross-Cultural Awareness Requirement.

# ANIMAL AND VETERINARY SCIENCES

## Bachelor of Science

The curriculum in Animal and Veterinary Sciences provides students with a broad base of understanding of scientific principles and the application of these principles to scientific, technical, and business phases of livestock and poultry production, processing, and marketing. Special emphasis is placed on hands-on instruction, and students are given many opportunities to work with animals at the Morgan Poultry Farm, LaMaster Dairy Center, Starkey Swine Center, Equine Center, and Simpson Beef Unit. Students may choose from three concentrations: Animal Agribusiness, Equine Business, or Preveterinary and Science.

Students choosing the Animal Agribusiness Concentration will be prepared for careers in the animal industries including production, sales and marketing, business management, advertising, and extension. Students in the Equine Business Concentration will be prepared for careers as trainers, managers, riding instructors, sales representatives, etc. Students selecting the Preveterinary and Science Concentration will meet the requirements for most veterinary schools, graduate schools, and medical and dental schools. Students with South Carolina residency may compete for slots at the Mississippi State, Tuskegee, and University of Georgia Colleges of Veterinary Medicine.

## ANIMAL AGRIBUSINESS CONCENTRATION

### Freshman Year

#### First Semester

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

## Second Semester

- 4 - BIOL 104 General Biology II *or*
    - 5 - BIOL 111 Principles of Biology II
  - 4 - CH 102 General Chemistry
  - 3 - ENGL 103 Accelerated Composition
  - 3 - MTHSC 101 Essen. Math. for Informed Soc. *or*
    - 3 - MTHSC 102 Intro. to Math. Analysis *or*
    - 4 - MTHSC 106 Calculus of One Variable I
- 
- 2 - AVS Techniques Requirement<sup>2</sup>
- 
- 16-18

## Sophomore Year

### First Semester

- 3 - ACCT 201 Financial Accounting Concepts
  - 3 - AP EC 202 Agricultural Economics
  - 3 - AVS 312 Forages and Grazing Systems
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 
- 2 - AVS Techniques Requirement<sup>2</sup>
- 
- 14

### Second Semester

- 3 - AVS 310 Animal Health
  - 2 - AVS Evaluation Requirement<sup>3</sup>
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Departmental Requirement<sup>4</sup>
  - 3 - Social Science Requirement<sup>1</sup>
  - 3 - Elective
- 
- 16

## Junior Year

### First Semester

- 4 - AVS 301 Anat. and Phys. of Domestic Animals
  - 3 - AVS 370 Principles of Animal Nutrition
  - 3 - AVS 470 Animal Genetics
  - 3 - Advanced Writing Requirement<sup>1</sup>
- 
- 3 - Departmental Requirement<sup>4</sup>
- 
- 16

### Second Semester

- 3 - AVS 375 Applied Animal Nutrition
  - 3 - AVS 413 Animal Products
  - 3 - AVS 453 Animal Reproduction
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Departmental Requirement<sup>4</sup>
  - 3 - Science and Tech. in Society Requirement<sup>1</sup>
- 
- 17

## Senior Year

### First Semester

- 12 - AVS 360 Advanced Internship

### Second Semester

- 2 - AVS 406 Seminars and Related Topics
  - 3 - AVS 410 Domestic Animal Behavior
  - 3 - AVS 415 Contemporary Issues in Animal Sci.
  - 4 - AVS 417 Animal Agribusiness Development
  - 4 - AVS 450 Animal Production Systems
- 
- 16
- 123-126 Total Semester Hours

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

<sup>2</sup>AVS 200, 201, 203, 204, or 206

<sup>3</sup>AVS 302, 309, 311, or 323

<sup>4</sup>AG M 402, 405, 410, AP EC 302, 309, 319, 351, 409, 420, 421, 433, 452, 456, 460, AVS 444, 455, CSENV 202, ECON 211, 212, MGT 201, 307, MKT 301, SPAN 101, or 102

## EQUINE BUSINESS CONCENTRATION

### Freshman Year

#### First Semester

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

#### Second Semester

- 2 - AVS 204 Horse Care Techniques
  - 4 - BIOL 104 General Biology II *or*  
5 - BIOL 111 Principles of Biology II
  - 4 - CH 102 General Chemistry
  - 3 - ENGL 103 Accelerated Composition
  - 3 - MTHSC 101 Essen. Math. for Informed Soc. *or*  
3 - MTHSC 102 Intro. to Math. Analysis *or*  
4 - MTHSC 106 Calculus of One Variable I
- 16-18

### Sophomore Year

#### First Semester

- 3 - ACCT 201 Financial Accounting Concepts
  - 3 - AP EC 202 Agricultural Economics
  - 3 - AVS 312 Forages and Grazing Systems
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 2 - AVS Techniques Requirement<sup>2</sup>
- 14

#### Second Semester

- 2 - AVS 309 Principles of Equine Evaluation
  - 3 - AVS 310 Animal Health
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Departmental Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>1</sup>
  - 3 - Elective
- 16

### Junior Year

#### First Semester

- 2 - AVS 205 Horsemanship I
  - 4 - AVS 301 Anat. and Phys. of Domestic Animals
  - 3 - AVS 370 Principles of Animal Nutrition
  - 3 - AVS 470 Animal Genetics
  - 3 - Advanced Writing Requirement<sup>1</sup>
- 15

#### Second Semester

- 3 - AVS 375 Applied Animal Nutrition
  - 3 - AVS 410 Domestic Animal Behavior
  - 3 - AVS 453 Animal Reproduction
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Departmental Requirement<sup>3</sup>
  - 3 - Elective
- 17

### Senior Year

#### First Semester

- 2 - AVS 385 Equine Behavior and Training
  - 2 - AVS 406 Seminars and Related Topics
  - 4 - AVS 416 Equine Exercise Physiology
  - 3 - AVS Experience-Based Activity<sup>4</sup>
  - 3 - Departmental Requirement<sup>3</sup>
- 14

### Second Semester

- 4 - AVS 412 Advanced Equine Management
  - 3 - AVS 415 Contemporary Issues in Animal Sci.
  - 4 - AVS 417 Animal Agribusiness Development
  - 3 - Science and Tech. in Society Requirement<sup>1</sup>
- 14
- 122–125 Total Semester Hours

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

<sup>2</sup>AVS 200, 201, 203, or 206

<sup>3</sup>AG M 402, 405, 410, AP EC 302, 309, 319, 351, 409, 420, 421, 433, 452, 456, 460, AVS 444, CSENV 202, ECON 211, 212, MGT 201, 307, MKT 301, SPAN 101, or 102

<sup>4</sup>AVS 441, 442, 443, or 491

## PREVETERINARY AND SCIENCE CONCENTRATION

### Freshman Year

#### First Semester

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

#### Second Semester

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

### Sophomore Year

#### First Semester

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

#### Second Semester

- 3 - CH 224 Organic Chemistry
  - 1 - CH 228 Organic Chemistry Lab.
  - 3 - EX ST 301 Introductory Statistics
  - 3 - PHYS 208 General Physics II
  - 1 - PHYS 210 General Physics II Lab.
  - 2 - AVS Evaluation Requirement<sup>3</sup> *or*  
3 - COMM 250 Public Speaking
  - 2 - AVS Techniques Requirement<sup>2</sup>
- 15-16

### Junior Year

#### First Semester

- 4 - AVS 301 Anat. and Phys. of Domestic Animals
  - 3 - AVS 370 Principles of Animal Nutrition
  - 3 - BIOCH 301 Molecular Biochemistry *or*  
3 - BIOCH 406 Physiological Chemistry
  - 3 - GEN 302 Molecular and General Genetics
  - 1 - GEN 303 Molecular and Gen. Genetics Lab.
- 14

#### Second Semester

- 3 - AVS 310 Animal Health
  - 3 - AVS 375 Applied Animal Nutrition
  - 3 - AVS 453 Animal Reproduction
  - 4 - MICRO 305 General Microbiology
  - 3 - Departmental Requirement<sup>4</sup>
- 16

### Senior Year

#### First Semester

- 2 - AVS 406 Seminars and Related Topics
  - 3 - Advanced Writing Requirement<sup>1</sup>
  - 3 - AVS Experienced-Based Activity<sup>5</sup>
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Departmental Requirement<sup>4</sup>
- 13

#### Second Semester

- 3 - AVS 410 Domestic Animal Behavior
  - 3 - AVS 413 Animal Products
  - 3 - AVS 415 Contemporary Issues in Animal Sci.
  - 3 - Departmental Requirement<sup>4</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 15

121–125 Total Semester Hours

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

<sup>2</sup>AVS 200, 201, 203, 204, or 206

<sup>3</sup>Select AVS 302, (FD SC) 304, 309, 311, or 323. One of these courses in combination with AVS 406 will satisfy the General Education Oral Communication Requirement.

<sup>4</sup>ACCT 201, AVS 411, 417, 444, 450, 455, 470, BIOSC 432, 433, 440, 450, 456, 457, 461, 462, 464, 468, 472, 477, (AVS) 480, MGT 201, 307, MICRO 407, 411, (AVS, BIOSC) 414, 416, or MKT 301

<sup>5</sup>AVS 441, 442, 443, or 491

## BIOCHEMISTRY

### Bachelor of Science

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

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

**Freshman Year****First Semester**

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

**Second Semester**

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

**Sophomore Year****First Semester**

- 3 - CH 223 Organic Chemistry
  - 1 - CH 227 Organic Chemistry Lab.<sup>1</sup>
  - 3 - GEN 302 Molecular and General Genetics
  - 1 - GEN 303 Molecular and Gen. Genetics Lab.
  - 3 - PHYS 122 Physics with Calculus I
  - 1 - PHYS 124 Physics Lab. I
  - 3-4 - Advanced Mathematics Requirement<sup>2</sup>
- 15-16

**Second Semester**

- 3 - BIOCH 301 Molecular Biochemistry
  - 3 - CH 224 Organic Chemistry
  - 1 - CH 228 Organic Chemistry Lab.<sup>1</sup>
  - 3 - COMM 150 Intro. to Human Comm. *or*
  - 3 - COMM 250 Public Speaking
  - 3 - PHYS 221 Physics with Calculus II
  - 1 - PHYS 223 Physics Lab. II
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 17

**Junior Year****First Semester**

- 3 - BIOCH 431 Physical Approach to Biochem.
  - 2 - BIOCH 433 General Biochemistry Lab. I
  - 3 - CH 330 Introduction to Physical Chemistry<sup>4</sup>
  - 3 - ENGL 314 Technical Writing
  - 3 - Science Requirement<sup>5</sup>
- 14

**Second Semester**

- 3 - BIOCH 432 Biochemistry of Metabolism
  - 2 - BIOCH 434 General Biochemistry Lab. II
  - 3 - BIOCH 436 Nucleic Acid and Protein Biosyn.
  - 3 - PHIL 326 Science and Values
  - 3 - Science Requirement<sup>5</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 17

**Senior Year****First Semester**

- 3 - BIOCH 491 Special Problems in Biochemistry<sup>6</sup>
  - 3 - BIOSC 461 Cell Biology
  - 3 - GEN 440 Bioinformatics
  - 4 - Elective<sup>7</sup>
- 13

**Second Semester**

- 3 - BIOCH 491 Special Problems in Biochemistry<sup>6</sup>
  - 2 - BIOCH (GEN) 493 Senior Seminar
  - 3 - Social Science Requirement<sup>8</sup>
  - 6 - Elective<sup>7</sup>
- 14

120–121 Total Semester Hours

<sup>1</sup>CH 225 may substitute for CH 227, and CH 226 may substitute for CH 228. In both cases, the additional hour of credit counts toward a science requirement.<sup>2</sup>EX ST 301, MTHSC 206, 301, or 302<sup>3</sup>See General Education Requirements.<sup>4</sup>CH 331 may be substituted.<sup>5</sup>Select from CH 411, ENT (GEN) 495, GEN (BIOSC) 405, 410, (BIOSC) 416, (BIOSC, MICRO) 418, 420, 450, HORT (BIOSC, GEN) 465, MICRO 415. Other courses must be approved by advisor.<sup>6</sup>To be taken over two semesters with the same faculty member<sup>7</sup>A two-semester sequence of a foreign language is strongly recommended.<sup>8</sup>See General Education Requirements. This course must also satisfy the Cross-Cultural Awareness Requirement.**BIOLOGICAL SCIENCES****Bachelor of Science**

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

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

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

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. See *Academic Regulations* in this catalog for enrollment guidelines and procedures.

Students are encouraged to obtain the specific requirements for the dual degree from the Department

of Biological Sciences or Bioengineering as early as possible in their undergraduate program as a number of required courses have prerequisites not normally taken by Biological Sciences majors.

**Freshman Year****First Semester**

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

**Second Semester**

- 5 - BIOL 111 Principles of Biology II<sup>1</sup>
  - 1 - BIOSC 102 Frontiers in Biology II
  - 4 - CH 102 General Chemistry
  - 3 - ENGL 103 Accelerated Composition
  - 4 - MTHSC 108 Calculus of One Variable II
- 17

**Sophomore Year****First Semester**

- 3 - CH 223 Organic Chemistry *and*
  - 1 - CH 227 Organic Chemistry Lab. *or*
  - 4 - CH 201 Survey of Organic Chemistry
  - 4 - Animal or Plant Diversity Requirement<sup>2</sup>
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
  - 4 - Biochemistry or Genetics Requirement<sup>4</sup>
- 15

**Second Semester**

- 3 - CH 224 Organic Chemistry *or*
  - 3 - Major Requirement<sup>5</sup>
  - 4 - Animal or Plant Diversity Requirement<sup>2</sup>
  - 4 - Biochemistry or Genetics Requirement<sup>4</sup>
  - 4 - Major Requirement<sup>5</sup>
- 15

**Junior Year****First Semester**

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

**Second Semester**

- 3 - PHIL 324 Philosophy of Technology *or*
  - 3 - PHIL 326 Science and Values
  - 3 - PHYS 208 General Physics II *and*
  - 1 - PHYS 210 General Physics II Lab. *or*
  - 3 - PHYS 221 Physics with Calculus II *and*
  - 1 - PHYS 223 Physics Lab. II
  - 5 - Major Requirement<sup>5</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 15

**Senior Year****First Semester**

- 2 - BIOSC (MICRO) 493 Senior Seminar
  - 13 - Major Requirement<sup>5</sup>
- 15

**Second Semester**

- 12 - Major Requirement<sup>5</sup>  
 3 - Social Science Requirement<sup>3</sup>

15

124 Total Semester Hours

<sup>5</sup>BIOL 110 and 111 are strongly recommended; however, BIOL 103 may substitute for BIOL 110, and BIOL 104 may substitute for BIOL 111. The remaining 1–2 credits required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 300 level or above. See advisor.

<sup>2</sup>At least one lecture and associated laboratory must be completed for both Animal Diversity (BIOSC 302/306 or BIOSC 303/307) and for Plant Diversity (BIOSC 304/308 or BIOSC 305/309).

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

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

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

*Ecology*—BIOSC 443/411, 441/445, 446/447, 470/471

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

The remaining courses may be selected from BIOCH 302, MICRO 305, or any BIOSC, BOT, or ZOOL courses at the 300-level or higher.

## ENTOMOLOGY EMPHASIS AREA

See *Bachelor of Science curriculum for freshman year requirements*.

**Sophomore Year****First Semester**

- 3 - CH 223 Organic Chemistry *and*  
 1 - CH 227 Organic Chemistry Lab. *or*  
 4 - CH 201 Survey of Organic Chemistry  
 4 - ENT (BIOSC) 301 Insect Biol. and Diversity  
 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
 4 - Biochemistry or Genetics Requirement<sup>2</sup>

15

**Second Semester**

- 3 - BIOSC 304 Biology of Plants *and*  
 1 - BIOSC 308 Biology of Plants Practicum *or*  
 3 - BIOSC 305 Biology of Algae and Fungi *and*  
 1 - BIOSC 309 Algae/Fungi Practicum  
 3 - CH 224 Organic Chemistry *or*  
 3 - Major Requirement<sup>3</sup>  
 4 - Biochemistry or Genetics Requirement<sup>2</sup>  
 4 - Major Requirement<sup>3</sup>

15

**Junior Year****First Semester**

- 3 - BIOSC 335 Evolutionary Biology  
 3 - ENGL 314 Technical Writing  
 3 - PHYS 207 General Physics I *and*  
 1 - PHYS 209 General Physics I Lab. *or*  
 3 - PHYS 122 Physics with Calculus I *and*  
 1 - PHYS 124 Physics Lab. I  
 4 - Entomology Requirement<sup>4</sup>

14

**Second Semester**

- 3 - PHIL 324 Philosophy of Technology *or*  
 3 - PHIL 326 Science and Values  
 3 - PHYS 208 General Physics II *and*  
 1 - PHYS 210 General Physics II Lab. *or*  
 3 - PHYS 221 Physics with Calculus II *and*  
 1 - PHYS 223 Physics Lab. II  
 3 - Entomology Requirement<sup>4</sup>  
 3 - Major Requirement<sup>3</sup>  
 3 - Social Science Requirement<sup>1</sup>

16

**Senior Year****First Semester**

- 3 - BIOSC 461 Cell Biology  
 2 - BIOSC 462 Cell Biology Lab.  
 2 - BIOSC (MICRO) 493 Senior Seminar  
 4 - Entomology Requirement<sup>4</sup>  
 4 - Major Requirement<sup>3</sup>

15

**Second Semester**

- 3 - Entomology Requirement<sup>4</sup>  
 9 - Major Requirement<sup>3</sup>  
 3 - Social Science Requirement<sup>1</sup>

15

124 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credits hours must also satisfy the Cross-Cultural Awareness Requirement.

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

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

*Ecology*—BIOSC 443/411, 441/445, 446/447, 470/471

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

The remaining courses may be selected from BIOCH 302, MICRO 305, or any BIOSC, BOT, or ZOOL courses at the 300 level or higher.

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

## TOXICOLOGY EMPHASIS AREA

See *Bachelor of Science curriculum for freshman year requirements*.

**Sophomore Year****First Semester**

- 3 - BIOSC 210 Introduction to Toxicology  
 3 - CH 223 Organic Chemistry<sup>1</sup> *and*  
 1 - CH 227 Organic Chemistry Lab.<sup>1</sup> *or*  
 4 - CH 201 Survey of Organic Chemistry  
 4 - Animal or Plant Diversity Requirement<sup>2</sup>  
 4 - Biochemistry or Genetics Requirement<sup>3</sup>

15

**Second Semester**

- 3 - CH 224 Organic Chemistry<sup>1</sup> *or*  
 3 - Major Requirement<sup>4</sup>  
 4 - Animal or Plant Diversity Requirement<sup>2</sup>  
 4 - Biochemistry or Genetics Requirement<sup>3</sup>  
 4 - Major Requirement<sup>4</sup>

15

**Junior Year****First Semester**

- 3 - BIOSC 335 Evolutionary Biology  
 3 - ENGL 314 Technical Writing  
 3 - ENTOX (BIOSC, ENT) 430 Toxicology  
 3 - PHYS 207 General Physics I *and*  
 1 - PHYS 209 General Physics I Lab. *or*  
 3 - PHYS 122 Physics with Calculus I *and*  
 1 - PHYS 124 Physics Lab. I

3 - Major Requirement<sup>4</sup>

16

**Second Semester**

- 3 - PHYS 208 General Physics II *and*  
 1 - PHYS 210 General Physics II Lab. *or*  
 3 - PHYS 221 Physics with Calculus II *and*  
 1 - PHYS 223 Physics Lab. II  
 3 - Arts and Humanities (Literature) Requirement<sup>5</sup>  
 4 - Major Requirement<sup>4</sup>  
 3 - Social Science Requirement<sup>5</sup>

14

**Senior Year****First Semester**

- 3 - BIOSC 461 Cell Biology  
 2 - BIOSC 462 Cell Biology Lab.  
 2 - BIOSC (MICRO) 493 Senior Seminar  
 3 - CH 313 Quantitative Analysis  
 1 - CH 317 Quantitative Analysis Lab.  
 3 - Major Requirement<sup>4</sup>

14

**Second Semester**

- 3 - CH 413 Chemistry of Aqueous Systems *or*  
 3 - ENTOX 421 Chemical Sources and Fate in  
 Environmental Systems  
 3 - PHIL 324 Philosophy of Technology *or*  
 3 - PHIL 326 Science and Values  
 4 - Major Requirement<sup>4</sup>  
 3 - Social Science Requirement<sup>5</sup>  
 3 - Toxicology Requirement<sup>6</sup>

16

124 Total Semester Hours

<sup>1</sup>CH 223/227 and 224 are recommended.

<sup>2</sup>At least one lecture and associated laboratory must be completed for both Animal Diversity (BIOSC 302/306 or BIOSC 303/307) and for Plant Diversity (BIOSC 304/308 or BIOSC 305/309).

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

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

*Ecology*—BIOSC 443/411, 441/445, 446/447, 470/471

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

The remaining courses may be selected from BIOCH 302, MICRO 305, or any BIOSC, BOT, or ZOOL courses at the 300-level or higher. BIOSC 441 and MICRO 305 are recommended.

<sup>5</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>6</sup>Any 400-level ENTOX course

## BIOLOGICAL SCIENCES

### Bachelor of Arts

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

#### Freshman Year

##### First Semester

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

##### Second Semester

5 - BIOL 111 Principles of Biology II<sup>1</sup>  
 1 - BIOSC 102 Frontiers in Biology II  
 4 - CH 102 General Chemistry  
 3 - ENGL 103 Accelerated Composition  
 4 - MTHSC 108 Calculus of One Variable II or  
 3 - MTHSC 301 Statistical Methods I  
 16-17

#### Sophomore Year

##### First Semester

4 - CH 201 Survey of Organic Chemistry<sup>2</sup>  
 4 - Animal or Plant Diversity Requirement<sup>3</sup>  
 4 - Biochemistry or Genetics Requirement<sup>4</sup>  
 4 - Foreign Language Requirement<sup>5</sup>  
 16

##### Second Semester

4 - Animal or Plant Diversity Requirement<sup>2</sup>  
 4 - Biochemistry or Genetics Requirement<sup>4</sup>  
 4 - Foreign Language Requirement<sup>5</sup>  
 3 - Minor Requirement<sup>6</sup>  
 15

#### Junior Year

##### First Semester

3 - BIOSC 335 Evolutionary Biology  
 3 - BIOSC 461 Cell Biology  
 3 - ENGL 314 Technical Writing  
 3 - Foreign Language Requirement<sup>5</sup>  
 3 - Major Requirement<sup>7</sup>  
 15

##### Second Semester

3 - PHIL 324 Philosophy of Technology or  
 3 - PHIL 326 Science and Values  
 3 - Foreign Language Requirement<sup>5</sup>  
 3 - Major Requirement<sup>7</sup>  
 6 - Minor Requirement<sup>6</sup>  
 15

#### Senior Year

##### First Semester

2 - BIOSC (MICRO) 493 Senior Seminar  
 3 - PHYS 207 General Physics I  
 1 - PHYS 209 General Physics I Lab.  
 3 - Major Requirement<sup>7</sup>  
 3 - Minor Requirement<sup>6</sup>  
 3 - Social Science Requirement<sup>8</sup>  
 15

##### Second Semester

3 - PHYS 208 General Physics II  
 1 - PHYS 210 General Physics II Lab.  
 3 - Arts and Humanities (Literature) Requirement<sup>8</sup>  
 3 - Major Requirement<sup>7</sup>  
 3 - Minor Requirement<sup>6</sup>  
 3 - Social Science Requirement<sup>8</sup>  
 16

125–126 Total Semester Hours

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

<sup>2</sup>CH 223, 227, and 224 may be substituted for CH 201. Most professional health sciences schools require two semesters of organic chemistry with laboratory.

<sup>3</sup>At least one lecture and associated laboratory must be completed for both Animal Diversity (BIOSC 302/306 or BIOSC 303/307) and for Plant Diversity (BIOSC 304/308 or BIOSC 305/309).

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

<sup>5</sup>Four semesters (through 202) in the same modern foreign language are required.

<sup>6</sup>See page 55 for approved minors.

<sup>7</sup>See advisor. Select one lecture course from each of the following fields:

*Ecology*—BIOSC 441, 443, 446, 470

*Physiology*—BIOSC 401, 459, 475

The remaining courses must be selected from MICRO 305 or other BIOSC, BOT, or ZOOLOG courses at the 300-level or higher.

<sup>8</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

## BIOSYSTEMS ENGINEERING

### Bachelor of Science

The Biosystems Engineering program is administered jointly with the College of Engineering and Science. See page 82 for the curriculum.

## ENVIRONMENTAL AND NATURAL RESOURCES

### Bachelor of Science

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

Three concentrations are offered within the Environmental and Natural Resources major. The Conservation Biology Concentration is oriented toward students who desire a greater exposure to

taxa, their habitats and their interrelationships. The Natural Resource and Economic Policy Concentration provides more in-depth study in economics and policy applications. The Natural Resources Management Concentration emphasizes both resource management and negotiation skills.

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

#### Freshman Year

##### First Semester

4 - BIOL 103 General Biology I  
 4 - CH 105 Beginning Gen. and Organic Chem.<sup>1</sup>  
 1 - ENR 101 Intro. to Env. and Natural Res. I  
 3 - MTHSC 102 Intro. to Mathematical Analysis  
 3 - Elective  
 15

##### Second Semester

4 - BIOL 104 General Biology II  
 4 - CH 106 Beginning Gen. and Organic Chem.<sup>1</sup>  
 3 - ENGL 103 Accelerated Composition  
 1 - FNR 102 FNR Freshman Portfolio  
 3 - Computer Science Requirement<sup>2</sup>  
 15

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

<sup>2</sup>AG ED 200, CP SC 120, or other course approved by advisor

## CONSERVATION BIOLOGY CONCENTRATION

### Sophomore Year

##### First Semester

3 - AP EC 257 Nat. Res., Environment, and Econ.  
 4 - BIOSC 320 Field Botany or  
 2 - FOR 205 Dendrology and  
 3 - FOR 221 Forest Biology  
 3 - EX ST 301 Introductory Statistics  
 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
 3 - Oral Communication Requirement<sup>1</sup>  
 16-17

##### Second Semester

4 - CSENV 202 Soils  
 3 - GEN 300 Fundamental Genetics  
 3 - WFB (BIOSC) 313 Conservation Biology  
 3 - Physical Environment Requirement<sup>2</sup>  
 3 - Taxonomy/Habitat Requirement<sup>3</sup>  
 16

### Junior Year

##### First Semester

3 - ENGL 314 Technical Writing  
 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
 3 - Ecology Requirement<sup>4</sup>  
 3 - Physiology Requirement<sup>5</sup>  
 3 - Taxonomy/Habitat Requirement<sup>3</sup>  
 15

**Second Semester**

- 3 - BIOSC 335 Evolutionary Biology
- 3 - E N R 302 Natural Resources Measurements
- 3 - Ecology Requirement<sup>4</sup>
- 3 - Natural Resource Economics Requirement<sup>6</sup>
- 3 - Taxonomy/Habitat Requirement<sup>3</sup>

15

**Senior Year****First Semester**

- 3 - E N R (BIOSC) 413 Restoration Ecology
- 3 - FOR (E N R) 434 GIS for Landscape Planning
- 3 - Conservation Policy/Law Requirement<sup>7</sup>
- 3 - Internship or Directed Research<sup>8</sup>
- 3 - Taxonomy/Habitat Requirement<sup>3</sup>

15

**Second Semester**

- 3 - E N R 450 Conservation Issues
- 1 - FOR 498 Senior Portfolio *or*
- 1 - W F B 498 Senior Portfolio
- 3 - Social Science Requirement<sup>1</sup>
- 6 - Taxonomy/Habitat Requirement<sup>3</sup>

13

120–121 Total Semester Hours

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

<sup>2</sup>GEOG 106, GEOL 101, or PHYS 240

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

<sup>4</sup>BIOSC 441, 442, 443, 446, or 470

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

<sup>6</sup>AP EC 433, 475, C R D 357, or FOR 304

<sup>7</sup>E N R 429, 450, or W F B 430

<sup>8</sup>See advisor.

## NATURAL RESOURCE AND ECONOMIC POLICY CONCENTRATION

**Sophomore Year****First Semester**

- 3 - AP EC 257 Natural Resources, Environment, and Economics
- 3 - PO SC 101 American National Government *or*
- 3 - PO SC 102 Intro. to International Rel.
- 3 - Ecology Requirement<sup>1</sup> *or*
- 3 - Minor Requirement
- 3 - Geography Requirement<sup>2</sup>
- 3 - Oral Communication Requirement<sup>3</sup>

15

**Second Semester**

- 3 - C R D 357 Natural Resources Economics
- 3 - ECON 212 Principles of Macroeconomics
- 3 - EX ST 301 Introductory Statistics
- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>

15

**Junior Year****First Semester**

- 3 - E N R 429 Environmental Law and Policy
- 3 - ECON 314 Intermediate Microeconomics
- 3 - W F B (BIOSC) 313 Conservation Biology *or*
- 3 - Minor Requirement
- 3 - Advanced Writing Requirement<sup>3</sup>
- 3 - Applied Economics Requirement<sup>4</sup>

15

**Second Semester**

- 3 - AP EC 457 Nat. Res. Econ. Theory and Policy
- 3 - ECON 319 Environmental Economics
- 3 - FOR (E N R) 434 GIS for Landscape Planning
- 3 - Ecology Requirement II<sup>5</sup> *or*
- 3 - Minor Requirement
- 3 - Macroeconomics Requirement<sup>6</sup>

15

**Senior Year****First Semester**

- 3 - C R D (AP EC) 491 Internship, Agribusiness, and Community and Rural Development *or*
- 3 - Minor Requirement
- 3 - EX ST 462 Statistics Applied to Economics
- 9 - Applied Economics Requirement<sup>4</sup> *or*
- 6 - Applied Economics Requirement<sup>4</sup> *and*
- 3 - Minor Requirement

15

**Second Semester**

- 3 - E N R 450 Conservation Issues
- 6 - Applied Economics Requirement<sup>4</sup>
- 3 - Community Development Requirement<sup>7</sup>
- 4 - Elective *or*
- 3 - Minor Requirement *and*
- 1 - Elective

16

121 Total Semester Hours

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

<sup>2</sup>GEOG 101, 103, or 106

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

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

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

<sup>6</sup>ECON 302, 310 or 315

<sup>7</sup>C R D 335 or 336

## NATURAL RESOURCES MANAGEMENT CONCENTRATION

**Sophomore Year****First Semester**

- 3 - AP EC 257 Natural Resources, Environment, and Economics
- 4 - CSENV 202 Soils
- 2 - FOR 205 Dendrology
- 3 - FOR 221 Forest Biology
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>

15

**Second Semester**

- 3 - FOR 206 Forest Ecology
- 3 - W F B (BIOSC) 313 Conservation Biology
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Oral Communication Requirement<sup>1</sup>
- 3 - Social Science Requirement<sup>1</sup>

15

**Junior Year****First Semester**

- 4 - BIOSC 320 Field Botany *or*
- 3 - BIOSC 406 Intro. Plant Taxonomy *and*
- 1 - BIOSC 407 Plant Taxonomy Lab.
- 3 - E N R 429 Environmental Law and Policy *or*
- 3 - FOR 400 Public Relations in Natural Res.
- 3 - FOR (E N R) 434 GIS for Landscape Planning

5 - Minor Requirement<sup>2</sup>

15

**Second Semester**

- 3 - C R D 357 Natural Resources Economics
- 3 - E N R 302 Natural Resources Measurements
- 3 - GEOL 101 Physical Geology
- 1 - GEOL 103 Physical Geology Lab.
- 3 - W F B 350 Principles of Fish and Wildlife Biol.
- 3 - Minor Requirement<sup>2</sup>

16

**Senior Year****First Semester**

- 2 - FOR (E N R) 416 Forest Policy and Admin.
- 3 - W F B 418 Fishery Conservation
- 3 - W F B 462 Wetland Wildlife Biology
- 3 - Conservation Colloquium or Internship<sup>3</sup>
- 4 - Minor Requirement<sup>2</sup>

15

**Second Semester**

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

15

121 Total Semester Hours

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

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

<sup>3</sup>See advisor.

## FOOD SCIENCE

### Bachelor of Science

Food Science majors apply principles of basic and applied sciences to the design, creation, manufacture, packaging, distribution, and utilization of safe, nutritious, and enjoyable foods and food products. The curriculum allows flexibility for concentrating in one of two areas.

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

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

Food processing industries, ingredient manufacturers, and packaging suppliers employ graduates in new food product development, quality assurance, production management, and technical sales. State and federal agencies also need graduates for food safety and regulatory positions. With the Nutrition and Dietetics Concentration, employment opportunities include dietitians, nutritionists, consultants, and food specialists. Placement rates are high for these fields, and graduates are also well prepared to pursue graduate study in many areas.

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

### Freshman Year

#### First Semester

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

#### Second Semester

- 4 - BIOL 104 General Biology II *or*
  - 5 - BIOL 111 Principles of Biology II
  - 4 - CH 102 General Chemistry
  - 3 - ENGL 103 Accelerated Composition
  - 2 - FD SC 102 Perspectives in Food and Nutrition Sciences
  - 3 - PSYCH 201 Introduction to Psychology
- 16-17

### Sophomore Year

#### First Semester

- 3 - AP EC 202 Agricultural Economics *or*
  - 3 - ECON 211 Principles of Microeconomics *or*
  - 3 - ECON 212 Principles of Macroeconomics
  - 4 - CH 201 Survey of Organic Chemistry *or*
  - 3 - CH 223 Organic Chemistry *and*
  - 1 - CH 227 Organic Chemistry Lab.
  - 3 - PHYS 122 Physics with Calculus I *and*
  - 1 - PHYS 124 Physics Lab. I *or*
  - 4 - PHYS 200 Introductory Physics *or*
  - 3 - PHYS 207 General Physics I *and*
  - 1 - PHYS 209 General Physics I Lab.
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 17

#### Second Semester

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

## FOOD SCIENCE AND TECHNOLOGY CONCENTRATION

### Junior Year

#### First Semester

- 1 - FD SC 421 Special Problems in Food Science
  - 4 - MICRO 305 General Microbiology
  - 3 - NUTR 451 Human Nutrition
  - 3 - Departmental Requirement<sup>2</sup>
  - 3 - Emphasis Area<sup>3</sup>
  - 3 - Elective
- 17

#### Second Semester

- 3 - ENGL 304 Business Writing *or*
  - 3 - ENGL 314 Technical Writing
  - 1 - FD SC 417 Seminar
  - 1 - FD SC 421 Special Problems in Food Science
  - 4 - MICRO 407 Food and Dairy Microbiology
  - 6 - Emphasis Area<sup>3</sup>
- 15

### Senior Year

#### First Semester

- 3 - FD SC 306 Food Service Operations
  - 4 - FD SC 401 Food Chemistry I
  - 3 - FD SC 404 Food Preservation and Processing
  - 2 - FD SC 407 Quantity Food Production
  - 1 - FD SC 421 Special Problems in Food Science
- 13

#### Second Semester

- 4 - FD SC 402 Food Chemistry II
  - 4 - FD SC 408 Food Process Engineering
  - 3 - FD SC (PKGSC) 409 Total Quality Mgt. for the Food and Packaging Industries
  - 1 - FD SC 418 Seminar
  - 1 - FD SC 421 Special Problems in Food Science
  - 3 - Emphasis Area<sup>3</sup>
- 16

122–125 Total Semester Hours

## NUTRITION AND DIETETICS CONCENTRATION

### Junior Year

#### First Semester

- 4 - BIOSC 222 Human Anatomy and Phys. I
  - 4 - MICRO 305 General Microbiology
  - 4 - NUTR 424 Medical Nutrition Therapy I
  - 3 - NUTR 451 Human Nutrition
- 15

#### Second Semester

- 4 - BIOSC 223 Human Anatomy and Phys. II
  - 3 - ENGL 304 Business Writing *or*
  - 3 - ENGL 314 Technical Writing
  - 1 - FD SC 417 Seminar
  - 4 - MICRO 407 Food and Dairy Microbiology
  - 3 - NUTR 455 Nutrition and Metabolism
- 15

### Senior Year

#### First Semester

- 3 - FD SC 306 Food Service Operations
  - 4 - FD SC 401 Food Chemistry I
  - 3 - FD SC 404 Food Preservation and Processing
  - 2 - FD SC 407 Quantity Food Production
  - 1 - FD SC 418 Seminar
  - 3 - Elective
- 16

#### Second Semester

- 4 - FD SC 402 Food Chemistry II
  - 3 - FD SC (PKGSC) 409 Total Quality Mgt. for the Food and Packaging Industries
  - 2 - FD SC 491 Practicum
  - 4 - NUTR 425 Medical Nutrition Therapy II
  - 3 - NUTR 426 Community Nutrition
- 16

123–126 Total Semester Hours

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

<sup>2</sup>AVS (FD SC) 304, 305, 323, 353, 354, 418, (FD SC) 430, or (FD SC) 431

<sup>3</sup>See advisor. Two credit hours of FD SC 421 are required in the emphasis area.

## FOREST RESOURCE MANAGEMENT

### Bachelor of Science

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

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

ment in academic work and in research conducted by public and private agencies.

The curriculum, accredited by the Society of American Foresters, provides a strong program in the basic knowledge and skills required of a professional forester. Forest Resource Management majors will select a minor. (See page 55.) The curriculum also provides the necessary prerequisites for graduate study.

## Freshman Year

### First Semester

- 4 - BIOL 103 General Biology I
  - 4 - CH 105 Beginning Gen. and Organic Chem.<sup>1</sup>
  - 1 - E N R 101 Intro. to Environ. and Natural Res. I
  - 3 - MTHSC 102 Intro. to Mathematical Analysis
  - 3 - Elective
- 
- 15

### Second Semester

- 4 - BIOL 104 General Biology II
  - 4 - CH 106 Begin. Gen. and Organic Chem.<sup>1</sup> *or*
  - 4 - PHYS 200 Introductory Physics
  - 3 - CP SC 120 Intro. to Information Technology
  - 3 - ENGL 103 Accelerated Composition
  - 1 - F N R 102 FNR Freshman Portfolio
- 
- 15

## Sophomore Year

### First Semester

- 4 - CSENV 202 Soils
  - 2 - EX ST 301 Introductory Statistics
  - 2 - FOR 205 Dendrology
  - 3 - FOR 221 Forestry Biology
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 
- 15

### Second Semester

- 3 - COMM 250 Public Speaking
  - 3 - FOR 206 Forestry Ecology
  - 3 - Economics Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>2</sup>
  - 3 - Minor Requirement<sup>4</sup>
- 
- 15

## Forestry Summer Camp

- 2 - FOR 251 Forest Communities
  - 4 - FOR 253 Forest Mensuration
  - 1 - FOR 254 Forest Products
- 
- 7

## Junior Year

### First Semester

- 2 - FOR 302 Forest Biometrics
  - 3 - FOR 304 Forest Resource Economics
  - 2 - FOR 308 Remote Sensing and GIS in Forestry
  - 4 - FOR 413 Integrated Forest Pest Management
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 
- 14

### Second Semester

- 3 - ENGL 314 Technical Writing
  - 3 - FOR 418 Forest Resource Valuation
  - 3 - FOR (E N R) 434 GIS for Landscape Planning
  - 4 - FOR 465 Silviculture
  - 3 - Minor Requirement<sup>4</sup>
- 
- 16

## Senior Year

### First Semester

- 1 - F N R 499 Natural Resources Seminar
  - 4 - FOR 314 Harvesting and Forest Products
  - 2 - FOR (E N R) 416 Forest Policy and Admin.
  - 3 - FOR 417 Forest Resource Mgt. and Regulation
  - 2 - FOR 431 Rec. Resource Plan. in Forest Mgt.
  - 3 - Minor Requirement<sup>4</sup>
- 
- 15

### Second Semester

- 2 - FOR 406 Forested Watershed Management
  - 3 - FOR 415 Forest Wildlife Management
  - 2 - FOR 425 Forest Resource Management Plans
  - 1 - FOR 498 Senior Portfolio
  - 6 - Minor Requirement<sup>4</sup>
- 
- 14

126 Total Semester Hours

<sup>1</sup>CH 101 and 102 may be substituted; however, students selecting this option may be required to use elective hours to satisfy the General Education Science and Technology in Society Requirement.

<sup>2</sup>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.)

<sup>3</sup>AP EC 257, ECON 200, 211, or 212

<sup>4</sup>To be selected by the middle of the sophomore year

## GENETICS

### Bachelor of Science

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

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

## Freshman Year

### First Semester

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

## Second Semester

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

## Sophomore Year

### First Semester

- 3 - CH 223 Organic Chemistry
  - 1 - CH 227 Organic Chemistry Lab.
  - 3 - COMM 150 Intro. to Human Comm. *or*
  - 3 - COMM 250 Public Speaking
  - 3 - GEN 302 Molecular and General Genetics
  - 3 - PHYS 122 Physics with Calculus I<sup>1</sup>
  - 1 - PHYS 124 Physics Lab. I<sup>1</sup>
- 
- 14

### Second Semester

- 3 - BIOCH 301 Molecular Biochemistry
  - 1 - BIOCH 302 Molecular Biochemistry Lab.
  - 3 - CH 224 Organic Chemistry
  - 1 - CH 228 Organic Chemistry Lab.
  - 3 - EX ST 301 Introductory Statistics
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 17

## Junior Year

### First Semester

- 3 - BIOSC 461 Cell Biology
  - 2 - BIOSC 462 Cell Biology Lab.
  - 3 - ENGL 314 Technical Writing
  - 3 - GEN 410 Fundamentals of Genetics I
  - 1 - GEN 411 Fundamentals of Genetics I Lab.
  - 3 - Science Requirement<sup>3</sup>
- 
- 15

### Second Semester

- 3 - GEN 420 Fundamentals of Genetics II
  - 1 - GEN 421 Fundamentals of Genetics II Lab.
  - 3 - GEN 440 Bioinformatics
  - 3 - PHIL 326 Science and Values
  - 3 - Genetics Requirement<sup>4</sup>
  - 3 - Elective<sup>5</sup>
- 
- 16

## Senior Year

### First Semester

- 3 - GEN 450 Comparative Genetics
  - 3 - GEN 491 Special Problems in Genetics<sup>6</sup>
  - 3 - Science Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>7</sup>
  - 3 - Elective<sup>5</sup>
- 
- 15

### Second Semester

- 2 - BIOCH (GEN) 493 Senior Seminar
  - 3 - GEN 491 Special Problems in Genetics<sup>6</sup>
  - 6 - Genetics Requirement<sup>4</sup>
  - 3 - Elective<sup>5</sup>
- 
- 14
- 121 Total Semester Hours

<sup>1</sup>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.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>BIOCH 423, 431, 432, BIOSC 335, 401, 432, 440, 459, 475, or MICRO 416. Other courses must be approved by advisor.

<sup>4</sup>AVS 470, BIOCH 436, CSENV 405, ENT (GEN) 495, GEN (BIOSC) 405, (BIOSC) 416, (BIOSC, MICRO) 418, HORT (BIOSC, GEN) 465, or MICRO 415

<sup>5</sup>Two-semesters of a foreign language are strongly recommended.

<sup>6</sup>To be taken over two semesters, preferably with the same faculty member

<sup>7</sup>See General Education Requirements. This course must also satisfy the Cross-Cultural Awareness Requirement.

## HORTICULTURE

### Bachelor of Science

Horticulture is the art, science, and business of food crops, ornamental plants, and turfgrasses and their production, utilization, and maintenance. A strong foundation in the basic sciences and humanities is built on courses in mathematics, chemistry, botany, physics, computer science, communications, economics, and humanities. Horticulture as a science depends on disciplines such as plant pathology, plant physiology, entomology, forestry, agronomy, soils, agricultural engineering, and agricultural economics. Business courses contribute to a well-rounded curriculum. A growing aspect of horticulture involves the management of enterprises, from production to distribution and marketing. Horticulture as an art involves the arrangement of plants in an aesthetically pleasing fashion.

Students begin professional development as undergraduates. An internship in a horticultural enterprise is required. Students considering graduate school are advised to take optional courses in the basic sciences as well as conduct an undergraduate research project. Those with strong interests in specific disciplines may complete special problems under the supervision of a faculty member.

### Freshman Year

#### First Semester

4 - BIOL 103 General Biology I  
3 - HORT 101 Horticulture  
3 - MTHSC 102 Intro. to Mathematical Analysis  
6 - Social Science Requirement<sup>1</sup>  
16

#### Second Semester

3 - BIOSC 205 Plant Form and Function *and*  
1 - BIOSC 206 Plant Form and Function Lab. *or*  
4 - BIOL 104 General Biology II  
3 - ENGL 103 Accelerated Composition  
1 - HORT 102 Experience Horticulture  
3 - MTHSC 101 Essential Math. for Informed Soc.  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
14

### Sophomore Year

#### First Semester

4 - CH 101 General Chemistry<sup>2</sup> *or*  
4 - CH 105 Begin. Gen. and Organic Chem.  
3 - HORT 303 Landscape Plants  
3 - Applied Science Requirement<sup>3</sup>  
3 - Business Requirement<sup>3</sup>  
3 - Oral Communication Requirement<sup>1</sup>  
16

### Second Semester

4 - CH 102 General Chemistry *or*  
4 - CH 106 Begin. Gen. and Organic Chem.  
3 - HORT 304 Annuals and Perennials  
3 - HORT 305 Plant Propagation  
1 - HORT 306 Plant Propagation Techniques Lab.  
3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
14

### Summer

3 - HORT 271 Internship<sup>4</sup> *or*  
3 - HORT 471 Advanced Internship<sup>4</sup>

### Junior Year

#### First Semester

4 - CSENV 202 Soils  
3 - Advanced Writing Requirement<sup>1</sup>  
3 - Business Requirement<sup>3</sup>  
3 - Horticulture Specialization Requirement<sup>3</sup>  
3 - Spanish Language Requirement<sup>3</sup>  
16

#### Second Semester

3 - BIOSC 401 Plant Physiology  
1 - BIOSC 402 Plant Physiology Lab.  
1 - HORT 409 Seminar  
4 - Business Requirement<sup>3</sup>  
3 - Horticulture Specialization Requirement<sup>3</sup>  
3 - Laboratory Science Requirement<sup>3</sup>  
15

### Senior Year

#### First Semester

6 - Applied Science Requirement<sup>3</sup>  
6 - Horticulture Specialization Requirement<sup>3</sup>  
12

#### Second Semester

3 - Applied Science Requirement<sup>3</sup>  
6 - Horticulture Specialization Requirement<sup>3</sup>  
4 - Laboratory Science Requirement<sup>3</sup>  
1 - Elective  
14

120 Total Semester Hours

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

<sup>2</sup>Students not taking the CH 105/106 sequence must satisfy the General Education Science and Technology in Society Requirement by selecting a qualifying course from the Applied Science or Laboratory Science Requirement.

<sup>3</sup>See advisor. Select from department-approved list.

<sup>4</sup>Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 303. Prior approval is required for internships, and a 2.0 grade-point ratio is required for registration.

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

## MICROBIOLOGY

### Bachelor of Science

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

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

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

### Freshman Year

#### First Semester

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

#### Second Semester

5 - BIOL 111 Principles of Biology II<sup>1</sup>  
4 - CH 102 General Chemistry  
3 - ENGL 103 Accelerated Composition  
3-4 - Mathematics Requirement<sup>2</sup>  
15-16

### Sophomore Year

#### First Semester

3 - CH 223 Organic Chemistry  
1 - CH 227 Organic Chemistry Lab.  
4 - MICRO 305 General Microbiology  
3 - Arts and Humanities (Literature) Requirement<sup>3</sup>  
3 - Elective<sup>4</sup>  
14

#### Second Semester

3 - BIOCH 301 Molecular Biochemistry  
3 - CH 224 Organic Chemistry  
1 - CH 228 Organic Chemistry Lab.  
3 - PHIL 324 Philosophy of Technology *or*  
3 - PHIL 326 Science and Values  
3 - Microbiology Requirement<sup>5</sup>  
3 - Social Science Requirement<sup>3</sup>  
16

**Junior Year****First Semester**

- 3 - BIOSC 461 Cell Biology
  - 4 - MICRO 401 Microbial Diversity and Ecology
  - 3 - PHYS 207 General Physics I *and*
  - 1 - PHYS 209 General Physics I Lab. *or*
    - 3 - PHYS 122 Physics with Calculus I *and*
    - 1 - PHYS 124 Physics Lab. I
  - 4 - Microbiology Requirement<sup>5</sup>
- 

**Second Semester**

- 3 - ENGL 314 Technical Writing
  - 4 - MICRO 412 Bacterial Physiology
  - 4 - MICRO 415 Microbial Genetics
  - 3 - PHYS 208 General Physics II *and*
  - 1 - PHYS 210 General Physics II Lab. *or*
    - 3 - PHYS 221 Physics with Calculus II *and*
    - 1 - PHYS 223 Physics Lab. II
- 

**Senior Year****First Semester**

- 3 - Social Science Requirement<sup>3</sup>
  - 8 - Microbiology Requirement<sup>5</sup>
  - 4 - Elective<sup>4</sup>
- 

**Second Semester**

- 2 - BIOSC (MICRO) 493 Senior Seminar
  - 4 - MICRO 411 Pathogenic Bacteriology
  - 3 - Microbiology Requirement<sup>5</sup>
  - 6 - Elective<sup>4</sup>
- 

122–123 Total Semester Hours

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

<sup>2</sup>MTHSC 108, 301, or EX ST 301

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

<sup>4</sup>Elective hours may be used toward satisfying the requirements of a minor.

<sup>5</sup>See advisor. Minimum of 18 credits is required. At least one course must be selected from each of the following fields:

*Biomedicine*—BIOSC 425, 456/457, GEN 302/303, HLTH 380, MICRO 400, (AVS, BIOSC) 414, 417

*Environmental*—MICRO 403, 410

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

*Virology*—BIOSC 454, MICRO 416

**BIOMEDICINE  
CONCENTRATION****Freshman Year****First Semester**

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

17

**Second Semester**

- 5 - BIOL 111 Principles of Biology II<sup>1</sup> *or*
    - 4 - BIOSC 315 Functional Human Anatomy
  - 4 - CH 102 General Chemistry
  - 3 - ENGL 103 Accelerated Composition
  - 3-4 - Mathematics Requirement<sup>2</sup>
- 

**Sophomore Year****First Semester**

- 3 - CH 223 Organic Chemistry
  - 1 - CH 227 Organic Chemistry Lab.
  - 4 - MICRO 305 General Microbiology
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
  - 3 - Elective
- 

**Second Semester**

- 3 - BIOCH 301 Molecular Biochemistry
  - 3 - CH 224 Organic Chemistry
  - 1 - CH 228 Organic Chemistry Lab.
  - 3 - PHIL 324 Philosophy of Technology *or*
    - 3 - PHIL 326 Science and Values
  - 3 - Biomedicine Requirement<sup>4</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 

**Junior Year****First Semester**

- 3 - GEN 302 Molecular and General Genetics
  - 1 - GEN 303 Molecular and Gen. Genetics Lab.
  - 4 - MICRO 401 Microbial Diversity and Ecology
  - 4 - MICRO (AVS, BIOSC) 414 Basic Immunology
  - 3 - PHYS 207 General Physics I *and*
  - 1 - PHYS 209 General Physics I Lab. *or*
    - 3 - PHYS 122 Physics with Calculus I *and*
    - 1 - PHYS 124 Physics Lab. I
- 

**Second Semester**

- 3 - ENGL 314 Technical Writing
  - 4 - MICRO 412 Bacterial Physiology
  - 4 - MICRO 415 Microbial Genetics
  - 3 - PHYS 208 General Physics II *and*
  - 1 - PHYS 210 General Physics II Lab. *or*
    - 3 - PHYS 221 Physics with Calculus II *and*
    - 1 - PHYS 223 Physics Lab. II
- 

**Senior Year****First Semester**

- 3 - BIOSC 461 Cell Biology
  - 2 - BIOSC 462 Cell Biology Lab.
  - 3 - MICRO 416 Introductory Virology
  - 3 - Social Science Requirement<sup>3</sup>
  - 4 - Elective
- 

**Second Semester**

- 2 - BIOSC (MICRO) 493 Senior Seminar
  - 4 - MICRO 411 Pathogenic Bacteriology
  - 3 - MICRO 417 Molecular Mechanisms of Carcinogenesis and Aging
  - 3 - Biomedicine Requirement<sup>4</sup>
  - 3 - Elective
- 

122–124 Total Semester Hours

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

<sup>2</sup>MTHSC 108, 301, or EX ST 301

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

<sup>4</sup>BIOCH 302, 423, 432, BIOSC 425, 456, 457, HLTH 380, MICRO 400, or 491

**PACKAGING SCIENCE****Bachelor of Science**

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

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

The core curriculum assures graduates of having the skills and knowledge required by most entry-level packaging positions. Emphasis area choices or approved minors allow students to select courses to improve career preparation for specific industry segments, including distribution and transportation, engineering technology, food and health care packaging, graphic communications, materials, business administration, entrepreneurship, environmental engineering, environmental science and policy, and management.

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

**Freshman Year****First Semester**

- 4 - BIOL 103 General Biology I
  - 4 - CH 101 General Chemistry
  - 4 - MTHSC 106 Calculus of One Variable I
  - 1 - PKGSC 101 Packaging Orientation<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 

**Second Semester**

- 4 - BIOL 104 General Biology II
  - 4 - CH 102 General Chemistry
  - 3 - ENGL 103 Accelerated Composition
  - 2 - PKGSC 102 Intro. to Packaging Science<sup>1</sup>
  - 1 - PKGSC 103 Packaging Science E-Portfolio
- 

14

**Sophomore Year****First Semester<sup>3</sup>**

- 4 - CH 201 Survey of Organic Chemistry *or*
  - 3 - CH 223 Organic Chemistry *and*
  - 1 - CH 227 Organic Chemistry Lab.
  - 3 - COMM 250 Public Speaking
  - 3 - PHYS 207 General Physics I *and*
  - 1 - PHYS 209 General Physics I Lab. *or*
  - 3 - PHYS 122 Physics with Calculus I *and*
  - 1 - PHYS 124 Physics Lab. II
  - 4 - PKGSC 202 Packaging Materials and Manuf.<sup>1</sup>
- 

**Second Semester<sup>3</sup>**

- 3 - PHYS 208 General Physics II *and*
  - 1 - PHYS 210 General Physics II Lab. *or*
  - 3 - PHYS 221 Physics with Calculus II *and*
  - 1 - PHYS 223 Physics Lab. II
  - 3 - PKGSC 201 Packaging Perishable Products
  - 3 - PKGSC 204 Container Systems<sup>1</sup>
  - 1 - PKGSC 206 Container Systems Lab.<sup>1</sup>
  - 3 - THRD 180 Intro. to Tech. Drawing and CAD
  - 3 - Departmental Requirement<sup>4</sup>
- 

**Summer**

- 0 - CO-OP 101 Cooperative Education<sup>5</sup>

**Junior Year****First Semester**

- 3 - PKGSC 320 Package Design Fundamentals
  - 3 - PKGSC 368 Packaging and Society
  - 3 - PKGSC 430 Converting for Flexible Packaging
  - 3 - PKGSC 440 Packaging for Distribution
  - 3 - Emphasis Area<sup>6</sup>
- 

**Second Semester**

- 3 - ENGL 314 Technical Writing
  - 3 - PKGSC 401 Packaging Machinery
  - 3 - PKGSC 404 Mechanical Properties of Packages and Principles of Protective Packaging<sup>7</sup>
  - 1 - PKGSC 454 Product and Package Eval. Lab.<sup>7</sup>
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Emphasis Area<sup>6</sup>
- 

**Senior Year****First Semester**

- 3 - EX ST 301 Introductory Statistics
  - 4 - PKGSC 416 Appl. of Polymers in Packaging
  - 4 - PKGSC 464 Food and Health Care Pkg. Syst.
  - 3 - Emphasis Area<sup>6</sup>
- 

**Second Semester**

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

123 Total Semester Hours

<sup>1</sup>A C or better is required in this course for graduation.<sup>2</sup>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. A 200-level or higher foreign language course is recommended to satisfy the Arts and Humanities (Non-Literature) Requirement.

<sup>3</sup>Students interested in minors or emphasis areas should take any prerequisites in the sophomore year.<sup>4</sup>See advisor.<sup>5</sup>At least one 15-week period (six months preferred) of Cooperative Education is required.<sup>6</sup>Completion of an approved minor or emphasis area is required. Approved minors are Business Administration, Entrepreneurship, Environmental Engineering, Environmental Science and Policy, Management.

Emphasis Areas consist of 15 credit hours selected from one of the following areas:

*Distribution and Transportation*—C E 255, 311, 410, 411, (C R P) 412, MGT 305, 317, 423, 424, 426

*Engineering Technology*—AG M 205, 406, 460, C E 253, E G 209, ENGR 120, 130, THRD 181, 220, 224, 250, 420

*Food and Health Care Packaging*—BIO E 302, 320, 401, FD SC 214, 401, 402, 404, MICRO 305, 407

*Graphic Communications*—G C 207, 215, 245, 310, 405, 406, 407, 440, 446

*Materials*—BIO E 302, C M E 210, 241, 319, FOR 441, PKGSC 471, TEXT 176

<sup>7</sup>PKGSC 404 and 454 must be taken concurrently.**PREPROFESSIONAL HEALTH STUDIES****Non-degree**

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

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

At Clemson, rather than having a separate, organized preprofessional health study program, students are allowed to major in any curriculum, as long as the basic entrance requirements of the professional health school are fulfilled. These schools are not as concerned about a student's major as they are about

academic performance whichever curriculum the student chooses. Professional health schools have neither preferences nor prejudices concerning any curriculum, which is evidenced by the fact that their entering students represent a broad spectrum of curricula. The emphasis is placed on the student's doing well in the curriculum chosen, and this becomes critical as competition increases for the limited number of places available in professional health schools.

**PREPHARMACY**

The two-year Prepharmacy program requires of 66–72 credit hours depending on the pharmacy school of interest. Upon completion of the program, students will be eligible to apply to a college of pharmacy, usually the South Carolina College of Pharmacy (MUSC and USC campuses), and may be eligible to apply for the Bachelor of Science in Preprofessional Studies<sup>6</sup>. 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**

- 4 - BIOL 103 General Biology I
  - 4 - CH 101 General Chemistry
  - 4 - MTHSC 106 Calculus of One Variable I
  - 3 - PSYCH 201 Introduction to Psychology
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 

**Second Semester**

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

**Second Year****First Semester**

- 4 - BIOSC 222 Human Anatomy and Phys. I<sup>2</sup> *or*
  - 4 - MICRO 305 General Microbiology<sup>2</sup>
  - 3 - CH 223 Organic Chemistry
  - 1 - CH 227 Organic Chemistry Lab.
  - 3 - PHYS 207 General Physics I
  - 1 - PHYS 209 General Physics I Lab.
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
  - 3 - History Requirement<sup>4</sup>
- 

**Second Semester**

- 3 - AG ED 200 Agricultural Applications of Educational Technology *or*
  - 3 - CP SC 120 Intro. to Information Tech.
  - 3 - CH 224 Organic Chemistry
  - 1 - CH 228 Organic Chemistry Lab.
  - 3 - COMM 150 Intro. to Human Comm. *or*
  - 3 - COMM 250 Public Speaking
  - 3 - PHYS 208 General Physics II
  - 1 - PHYS 210 General Physics II Lab.
  - 3 - Science and Tech. in Society Requirement<sup>5</sup>
  - 1 - Elective
-

## Third Year<sup>6</sup>

72–90 Total Semester Hours

<sup>1</sup>A A H 210, MUSIC 210, or THEA 317

<sup>2</sup>The Medical University of South Carolina requires MICRO 305. The University of South Carolina requires a BIOSC 222 and 223. To be eligible for both professional schools, the course(s) not taken this semester must be taken during a summer term or third year of study.

<sup>3</sup>Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

<sup>4</sup>See advisor.

<sup>5</sup>See General Education Requirements.

<sup>6</sup>Students planning to receive the Bachelor of Science degree upon completion of the program are required to complete an additional 18 credit hours. See advisor for requirements.

Note: The University of South Carolina requires credit for two semesters of a foreign language or exemption by examination. Students are expected to have completed this requirement in high school.

## PREREHABILITATION SCIENCES

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

Because preparation for some of the concentrations, such as the physical therapy, occupational therapy, and communication sciences and disorders programs at MUSC, requires a baccalaureate degree in any area, students are advised to select a major with similar requirements after consultation with the Prerehabilitation Sciences advisor. The following curriculum fulfills the general requirements for those fields, requiring less than a baccalaureate degree. Electives should be chosen after consultation with the advisor. Professional schools may change their requirements at any time, so it is imperative that students in this major stay in close contact with their advisor.

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

### First Year

#### First Semester

4 - BIOL 103 General Biology I  
4 - CH 101 General Chemistry  
3 - PSYCH 201 Introduction to Psychology  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
3 - Mathematics Requirement<sup>2</sup>  
17

#### Second Semester

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

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## Second Year

### First Semester

4 - BIOSC 222 Human Anatomy and Phys. I  
3 - PHYS 207 General Physics I  
1 - PHYS 209 General Physics I Lab.  
3 - PSYCH 340 Lifespan Developmental Psych.  
3 - Arts and Humanities (Literature) Requirement<sup>3</sup>  
3 - Arts and Humanities Requirement<sup>1</sup>  
17

### Second Semester

4 - BIOSC 223 Human Anatomy and Phys. II  
3 - COMM 150 Intro. to Human Comm. *or*  
3 - COMM 250 Public Speaking  
3 - CP SC 120 Intro. to Information Technology  
3 - PHYS 208 General Physics II  
1 - PHYS 210 General Physics II Lab.  
3 - Science and Tech. in Society Requirement<sup>1</sup>  
17

## Third Year<sup>4</sup>

90 Total Semester Hours

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

<sup>2</sup>See advisor.

<sup>3</sup>Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

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

## PREVETERINARY MEDICINE

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

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

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

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

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

## TURFGRASS

### Bachelor of Science

The Turfgrass program is designed for students interested in careers in the rapidly growing turfgrass industry, with courses in turfgrass management, pathology, agricultural mechanization, personnel management, soil fertility, soil microbiology, weed control, and park and recreation management. Graduates pursue careers in professional lawn care; maintenance of parks, athletic fields, and golf courses; production and sale of seed, sod, supplies, and equipment; or as technicians for businesses or government agencies.

### Freshman Year

#### First Semester

4 - BIOL 103 General Biology I  
3 - HORT 101 Horticulture  
3 - MTHSC 102 Intro. to Mathematical Analysis  
6 - Social Science Requirement<sup>1</sup>  
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#### Second Semester

3 - BIOSC 205 Plant Form and Function *and*  
1 - BIOSC 206 Plant Form and Function Lab. *or*  
4 - BIOL 104 General Biology II  
3 - ENGL 103 Accelerated Composition  
1 - HORT 102 Experience Horticulture  
3 - MTHSC 101 Essential Math for Informed Soc.  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
14

**Sophomore Year****First Semester**

- 4 - CH 101 General Chemistry<sup>2</sup> *or*
  - 4 - CH 105 Begin. Gen. and Organic Chem.
  - 3 - HORT 212 Introduction to Turfgrass Culture
  - 1 - HORT 213 Turfgrass Culture Lab.
  - 3 - HORT 303 Landscape Plants
  - 3 - Oral Communication Requirement<sup>1</sup>
- 
- 14

**Second Semester**

- 4 - CH 102 General Chemistry *or*
  - 4 - CH 106 Begin. Gen. and Organic Chem.
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Business Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 13

**Summer**

- 3 - HORT 271 Internship<sup>4</sup> *or*
- 3 - HORT 471 Advanced Internship<sup>4</sup>

**Junior Year****First Semester**

- 4 - CSENV 202 Soils
  - 3 - Applied Science Requirement<sup>3</sup>
  - 3 - Business Requirement<sup>3</sup>
  - 3 - Spanish Requirement<sup>3</sup>
- 
- 13

**Second Semester**

- 3 - BIOSC 401 Plant Physiology
  - 1 - BIOSC 402 Plant Physiology Lab.
  - 1 - HORT 409 Seminar
  - 3 - HORT 420 Applied Turfgrass Physiology
  - 3 - Advanced Writing Requirement<sup>1</sup>
  - 4 - Laboratory Science Requirement<sup>3</sup>
- 
- 15

**Maymester**

- 2 - PL PA (ENT) 406 Diseases and Insects of Turfgrasses

**Senior Year****First Semester**

- 3 - HORT 412 Advanced Turfgrass Management
  - 6 - Horticulture Specialization Requirement<sup>3</sup>
  - 4 - Laboratory Science Requirement<sup>3</sup>
  - 3 - Soils Requirement<sup>3</sup>
- 
- 16

**Second Semester**

- 3 - HORT (CSENV) 433 Landscape and Turf Weed Management
  - 3 - Applied Science Requirement<sup>3</sup>
  - 3 - Business Requirement<sup>3</sup>
  - 3 - Horticulture Specialization Requirement<sup>3</sup>
  - 3 - Soils Requirement<sup>3</sup>
- 
- 15

121 Total Semester Hours

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

<sup>2</sup>Students not taking the CH 105/106 sequence must satisfy the General Education Science and Technology in Society Requirement by selecting a qualifying course from the Applied Science or Laboratory Science Requirement.

<sup>3</sup>See advisor. Select from department-approved list.

<sup>4</sup>Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 212/213. Prior approval is required for internships, and a 2.0 grade-point ratio is required for registration.

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

**WILDLIFE AND FISHERIES BIOLOGY****Bachelor of Science**

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

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

**Combined Bachelor of Science/ Master of Science Degree Program**

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

**Freshman Year****First Semester**

- 4 - BIOL 103 General Biology I
  - 4 - CH 105 Beginning Gen. and Organic Chem.<sup>1</sup>
  - 1 - E N R 101 Intro. to Env. and Natural Res. I
  - 3 - MTHSC 102 Intro. to Mathematical Analysis
  - 3 - Elective
- 
- 15

**Second Semester**

- 4 - BIOL 104 General Biology II
  - 4 - CH 106 Begin. Gen. and Organic Chem.<sup>1</sup> *or*
  - 4 - PHYS 200 Introductory Physics<sup>1</sup>
  - 3 - CP SC 120 Intro. to Information Technology
  - 3 - ENGL 103 Accelerated Composition
  - 1 - F N R 102 FNR Freshman Portfolio
- 
- 15

**Sophomore Year****First Semester**

- 4 - CSENV 202 Soils
  - 2 - FOR 205 Dendrology
  - 3 - FOR 221 Forest Biology
  - 3 - W F B 300 Wildlife Biology
  - 1 - W F B 301 Wildlife Biology Lab.
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 
- 16

**Second Semester**

- 3 - BIOSC 303 Vertebrate Biology
  - 3 - COMM 250 Public Speaking
  - 3 - W F B 350 Principles of Fish and Wildlife Biol.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 15

**Junior Year****First Semester**

- 3 - AP EC 257 Nat. Res., Environment, and Econ.
  - 4 - BIOSC 320 Field Botany
  - 3 - ENGL 314 Technical Writing
  - 3 - GEN 300 Fundamental Genetics
  - 3 - W F B 462 Wetland Wildlife Biology
- 
- 16

**Second Semester**

- 3 - E N R 302 Natural Resources Measurements
  - 3 - EX ST 301 Introductory Statistics
  - 3 - W F B (BIOSC) 313 Conservation Biology
  - 3 - W F B 410 Wildlife Management Techniques
  - 3 - Approved Requirement<sup>3</sup>
- 
- 15

**Senior Year****First Semester**

- 4 - AVS 301 Anat. and Phys. of Domestic Animals
  - 3 - W F B 412 Wildlife Management
  - 3 - Approved Requirement<sup>3</sup>
  - 3 - Ecology Requirement<sup>4</sup>
  - 3 - Policy and Law Requirement<sup>3</sup>
- 
- 16

**Second Semester**

- 1 - F N R 499 Natural Resources Seminar
  - 3 - W F B 416 Fishery Biology
  - 3 - W F B 440 Non-game Wildlife Management
  - 1 - W F B 498 Senior Portfolio
  - 6 - Approved Requirement<sup>3</sup>
- 
- 14

122 Total Semester Hours

<sup>1</sup>Students planning to take organic chemistry should substitute CH 101 and 102.

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

<sup>3</sup>Select from department-approved list.

<sup>4</sup>BIOSC 441, 443, 446, or FOR 315

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