

skills, and passion to utilize those plants for the betterment of humankind.

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

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

## Freshman Year

### First Semester

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology Lab. I
  - 4 - CH 1010 General Chemistry
  - 3 - HORT 1010 Horticulture
  - 4 - Elective
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- 15

### Second Semester

- 3 - BIOL 1040 General Biology II
  - 1 - BIOL 1060 General Biology Lab II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - MATH 1020 Business Calculus I
  - 3 - Business Requirement<sup>1</sup>
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- 17

## Sophomore Year

### First Semester

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

### Second Semester

- 3 - HORT 2110 Growing Plants in the Spring
  - 4 - PES 2020 Soils
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>2</sup>
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- 13

## Summer

- 3 - HORT 2710 Internship<sup>3</sup> *or*
- 3 - HORT 4710 Advanced Internship<sup>3</sup>

## Junior Year

### First Semester

- 3 - HORT 3080 Sustainable Landscape Garden Design
  - 3 - Business Requirement<sup>1</sup>
  - 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>2</sup>
  - 3 - Related Science Requirement<sup>1</sup>
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- 15

## Second Semester

- 3 - BIOL 4010 Plant Physiology
  - 1 - BIOL 4020 Plant Physiology Lab
  - 3 - HORT 4040 Plant Propagation
  - 1 - HORT 4050 Plant Propagation Techniques Lab.
  - 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
  - 1 - Elective
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- 15

## Senior Year

### First Semester

- 3 - HORT 4090 Senior Capstone Course
  - 3 - Business Requirement<sup>1</sup>
  - 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 3 - Related Science Requirement<sup>1</sup>
  - 3 - Elective
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- 15

### Second Semester

- 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 6 - Related Science Requirement<sup>1</sup>
  - 3 - Elective
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- 12

121 Total Semester Hours

<sup>1</sup>See advisor. Select from department-approved list.

<sup>2</sup>See General Education Requirements. The Cross-Cultural Awareness Requirement and Science and Technology in Society General Education requirements must also be satisfied through these courses.

<sup>3</sup>Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 3030. Prior approval is required for internships, and a 2.0 grade-point average is required for registration.

*Note:* Horticulture majors must earn a C or better in all HORT classes.

## 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 minors allow students to select courses to improve career preparation for specific industry segments, including: Distribution, Transportation and Engineering Technology; Food and Health Care Packaging; Materials; and Package Design and Graphics. Alternatively, any University-approved minor may be completed.

Students changing majors into Packaging Science must:

1. have an overall minimum GPA of 2.0; and

2. have completed four of the following courses with an average GPA of 2.7:  
BIOL 1030, 1040, CH 1010, 1020, MATH 1060, PHYS 1220, 2070, 2080, 2210; or both MATH 1040 and 1070; and
3. have completed PKSC 1020 with a grade of B or higher.

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

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

## Freshman Year

### First Semester

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology Lab. I
  - 4 - CH 1010 General Chemistry
  - 4 - MATH 1060 Calculus of One Variable I
  - 1 - PKSC 1010 Packaging Orientation<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
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- 16

### Second Semester

- 3 - BIOL 1040 General Biology II
  - 1 - BIOL 1060 General Biology Lab. II
  - 4 - CH 1020 General Chemistry
  - 3 - COMM 1500 Intro to Human Comm *or*
  - 3 - COMM 2500 Public Speaking
  - 3 - ENGL 1030 Accelerated Composition
  - 2 - PKSC 1020 Intro. to Packaging Science<sup>1</sup>
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- 16

## Sophomore Year

### First Semester<sup>3</sup>

- 3 - CH 2010 Survey of Organic Chemistry *and*
  - 1 - CH 2020 Survey of Organic Chemistry Lab. *or*
  - 3 - CH 2230 Organic Chemistry *and*
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - PHYS 1220 Physics with Calculus I *and*
  - 1 - PHYS 1240 Physics Lab. II *or*
  - 3 - PHYS 2070 General Physics I *and*
  - 1 - PHYS 2090 General Physics I Lab.
  - 4 - PKSC 2020 Packaging Materials and Manuf.<sup>1</sup>
  - 4 - PKSC 2200 Product/Package Design and Prototyping<sup>1</sup>
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- 16

### Second Semester<sup>3</sup>

- 3 - PHYS 2080 General Physics II *and*
  - 1 - PHYS 2100 General Physics II Lab. *or*
  - 3 - PHYS 2210 Physics with Calculus II *and*
  - 1 - PHYS 2230 Physics Lab. II
  - 3 - PKSC 2010 Packaging Perishable Products<sup>1</sup>
  - 3 - PKSC 2040 Container Systems<sup>1</sup>
  - 1 - PKSC 2060 Container Systems Lab.<sup>1</sup>
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
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- 14

## Summer

- 0 - COOP 1010 Cooperative Education<sup>4</sup>

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

- 3 - ENGL 3140 Technical Writing
- 4 - GC 1030 Graphic Comm. I for Packaging Sci.
- 3 - PKSC 4010 Packaging Machinery<sup>1</sup>
- 3 - PKSC 4040 Mechanical Properties of Packages and Principles of Protective Packaging<sup>1,5</sup>
- 1 - PKSC 4540 Product and Package Eval. Lab.<sup>1,5</sup>
- 3 - Emphasis Area Requirement<sup>6</sup>

17

**Second Semester**

- 3 - PKSC 3200 Package Design Theory<sup>1</sup>
- 3 - PKSC 3680 Packaging and Society<sup>1</sup>
- 3 - PKSC 4300 Converting for Flexible Packaging<sup>1</sup>
- 3 - PKSC 4400 Packaging for Distribution<sup>1</sup>
- 3 - Emphasis Area Requirement<sup>6</sup>

15

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

- 4 - PKSC 4160 Appl. of Polymers in Packaging<sup>1</sup>
- 4 - PKSC 4640 Food and Health Care Pkg. Syst.<sup>1</sup>
- 3 - STAT 2300 Statistical Methods I
- 3 - Emphasis Area Requirement<sup>6</sup>

14

**Second Semester**

- 3 - AGRB 2020 Agricultural Economics *or*
- 3 - ECON 2110 Principles of Microeconomics
- 1 - PKSC 4030 Packaging Career Preparation<sup>1</sup>
- 3 - PKSC 4200 Package Design and Development<sup>1</sup>
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 6 - Emphasis Area Requirement<sup>6</sup>

16

## 124 Total Semester Hours

<sup>1</sup>Packaging Science majors are required to:

- 1. Complete PKSC 1020, 2020, 2040, and 2060 with a grade of C or better before being allowed to register for PKSC 4010, 4040, 4160, 4300, 4400, 4540, 4640.

- 2. Earn a C or better in all PKSC courses in order to graduate

<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 or applied economics. A 2000-level or higher modern 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>At least one 15-week period of 40 hour weeks of Cooperative Education is required. A six-month period is preferred. Two 10-week summer periods of 40 hour weeks with the same company is an option.

<sup>5</sup>PKSC 4040 and 4540 must be taken concurrently.

<sup>6</sup>Completion of any emphasis area or university approved minor is required. The approved course list of the four emphasis areas is available in the departmental undergraduate student handbook or the department office. Emphasis areas consist of 15 credit hours selected from one of the following areas (additional emphasis area courses may be approved by emphasis area coordinator):

*Distribution, Transportation and Engineering Technology; Food and Health Care Packaging; Package Design and Graphics; and Materials.*

**PLANT AND ENVIRONMENTAL SCIENCES****Bachelor of Science**

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

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

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

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

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

- 3 - BIOL 1030 General Biology I<sup>1</sup>
- 1 - BIOL 1050 General Biology Lab. I<sup>1</sup>
- 4 - CH 1010 General Chemistry
- 3 - MATH 1020 Business Calculus I *or*
- 4 - MATH 1060 Calculus of One Variable I
- 3 - PES 1040 Introduction to Plant Science

14-15

**Second Semester**

- 3 - BIOL 1040 General Biology II<sup>1</sup>
- 1 - BIOL 1060 General Biology Lab II<sup>1</sup>
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - STAT 2300 Statistical Methods I
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>

17

<sup>1</sup>BIOL 1100 may substitute for BIOL 1030/1050 and BIOL 1110 may substitute for BIOL 1040/1060; BIOL 1100 and 1110 are recommended for students in the Agricultural Biotechnology Concentration.

<sup>2</sup>See General Education Requirements. PHIL 1030 is recommended for students in the Agricultural Biotechnology Concentration.

**AGRICULTURAL BIOTECHNOLOGY CONCENTRATION****Sophomore Year****First Semester**

- 3 - BIOL 3040 Biology of Plants
- 3 - CH 2010 Survey of Organic Chemistry
- 1 - CH 2020 Survey of Organic Chemistry Lab.
- 4 - ENT 3010 Insect Biology and Diversity
- 3 - PLPA 3100 Principles of Plant Pathology

14

**Second Semester**

- 3 - AGRB 2050 Agriculture and Society
- 3 - BIOL 3350 Evolutionary Biology
- 3 - COMM 1500 Intro. to Human Comm. *or*
- 3 - COMM 2500 Public Speaking
- 3 - GEN 3000 Fundamental Genetics
- 4 - MICR 3050 General Microbiology
- 1 - PES 4550 Seminar

17

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

- 3 - BCHM 3050 Essential Elements of Biochem.
- 2 - BIOL 4340 Biological Chem. Lab. Tech
- 3 - ECON 2000 Economic Concepts *or*
- 3 - ECON 2110 Principles of Microeconomics
- 3 - PES 3350 Agricultural Biotechnology
- 3 - PES 4220 Major World Crops
- 3 - Social Science Requirement<sup>1</sup>

17

**Second Semester**

- 3 - BIOL 4010 Plant Physiology
- 1 - BIOL 4020 Plant Physiology Lab.
- 3 - ENGL 3150 Scientific Writing and Comm.
- 1 - PES 4010 Academic and Professional Dev.
- 3 - PES 4050 Plant Breeding
- 3 - PES 4090 Biology of Invasive Plants

14

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

- 2 - PES 4450 Regulatory Issues and Policies
- 3 - PES 4900 Beneficial Soil Organisms in Plant Growth
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 6 - Concentration Requirement<sup>2</sup>

14