



# COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

## UNDERGRADUATE PROGRAMS

- **Taking Courses Pass/Fail**
- **Dean's Scholar Program**
- **Preveterinary Instruction**
- **Agriculture and Natural Resources**
- **Agricultural Education**
- **Animal and Food Sciences**

In the College of Agriculture and Natural Resources, business, education, science and technology are used to solve problems related to environmental protection; food and fiber production; and animal and plant health. Comprising nearly 25% of the nation's workforce, agriculture and natural resources provide career opportunities in research, industry, education and government.

The curricula provide a flexible program of study designed to educate students on the rapid changes and improvements in agriculture and natural resources. Frequent consultation with faculty advisors helps students progress toward achieving their educational goals. College faculty encourage and support students to pursue Degrees with Distinction, to take courses in the University Honors Program, and to participate in the Science and Engineering Scholars summer research program.

Undergraduate majors are offered in agriculture and natural resources, agricultural education, animal science, engineering technology, entomology, environmental soil science, food and agribusiness management, food science and technology, landscape horticulture, natural resource management, plant protection, plant science, resource economics, statistics, and wildlife conservation.

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### TAKING COURSES PASS/FAIL

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Courses taken pass/fail cannot be used to complete major or group requirements in the College of Agriculture and Natural Resources. Pass/fail courses can be counted only as free electives.

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### DEAN'S SCHOLAR PROGRAM

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The Dean's Scholar Program serves students whose clearly defined educational goals cannot be effectively achieved by pursuing the standard curricula for all existing majors, minors, and interdepartmental majors sponsored by the University. Driven by an overarching passion or curiosity that transcends typical disciplinary bounds and curricula, a Dean's Scholar's intellectual interests may lead to broad interdisciplinary explorations of an issue or to more intense, in-depth studies in a single field at a level akin to graduate

- **Bioresources Engineering**
- **Entomology and Wildlife Ecology**
- **Food and Resource Economics**
- **Natural Resource Management**
- **Plant and Soil Sciences**
- **The Associate in Science Degree**

work. In consultation with faculty advisors and the Assistant Dean of their college, Dean's Scholars design an imaginative and rigorous individual plan of study to meet the total credit hours required for graduation. Dean's Scholars in Agriculture and Natural Resources may qualify for Honors Degrees. Contact the Assistant Dean in the college or go to [www.udel.edu/deansscholar/](http://www.udel.edu/deansscholar/) for more information and the application.

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### PREVETERINARY INSTRUCTION

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Students who wish to prepare for entrance to a veterinary school should consult with the Department of Animal and Food Sciences. See the preveterinary undergraduate curriculum in the Animal Science major.

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### AGRICULTURE AND NATURAL RESOURCES

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Telephone: (302) 831-2508  
E-mail: [kra@udel.edu](mailto:kra@udel.edu)  
<http://ag.udel.edu>

For the undergraduate with broad interests, the major in agriculture and natural resources is offered. The program is administered through the Office of the Academic Programs in the College of Agriculture and Natural Resources.

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### DEGREE: BACHELOR OF SCIENCE MAJOR: AGRICULTURE AND NATURAL RESOURCES

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CURRICULUM	CREDITS
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#### UNIVERSITY REQUIREMENTS

ENGL 110	Critical Reading and Writing (minimum grade of C) . . . . .	3
First Year Experience (see page 68) . . . . .		0-4
Discovery Learning Experience (see page 68) . . . . .		3
Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related content (see pages 68-70) . . . . .		3

**MAJOR REQUIREMENTS****Mathematics and Computer Science**

Mathematics course (MATH 115 or higher)	3
Mastering the Freshman Year (AGRI 165)	1
Computer Science course (FREC 135 or equivalent)	3

**Agricultural and Biological Sciences**

9-12  
Minimum of one course in three of the following areas: Agriculture, Agricultural Education, Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Animal Science, Entomology and Wildlife Ecology, Plant and Soil Sciences, Statistics, or Biology.

**Social Sciences and Humanities**

9  
Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

**Physical Sciences**

8  
Minimum of eight credits selected from one of the following two-course sequences:  
CHEM 101/102 or 103/104  
PHYS 201/202 or 207/208  
SCEN 101/102

**Communications**

A minimum of one course in written communications chosen from the following: 3  
ENGL 301 Expository Writing  
ENGL 302 Advanced Composition  
ENGL 312 Written Communications in Business  
ENGL 410 Technical Writing

A minimum of one course in oral communications chosen

from the following: 3  
AGRI 212 Oral Communication in Agriculture and Natural Resources  
COMM 212 Oral Communication in Business  
COMM 255 Fundamentals of Communication  
COMM 350 Public Speaking

**Literature and Arts**

6  
A minimum of six credits, other than those communications courses listed above, selected from English, Art, Art History, Communication, Music, Theatre, or Foreign Language, or courses cross-listed in these departments.

**Within the college**

30  
Thirty additional credits from any of the following departments (fifteen credits of the 30 must be at the 300 level or higher).  
Food and Resource Economics, Bioresources Engineering, Agricultural Education, Animal Science, Entomology and Wildlife Ecology, Food Science, Statistics, Agriculture, or Plant and Soil Sciences. A maximum of twelve credits of Special Problem/Independent Study/Field Experience may be counted toward the degree, with a maximum of six credits in any one department.

**ELECTIVES**

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only four credits total of HESC 120 activity or performing Music credit may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF 124**

**AGRICULTURAL EDUCATION**

Telephone: (302) 831-4232  
E-mail: pbarber@udel.edu  
http://ag.udel.edu

This program offers a Bachelor of Science degree that qualifies the individual for teacher certification in agricultural and natural resources education. It provides students with an opportunity to gain a broad understanding and professional preparation in the areas of animal science, plant and soil sciences, food science, engineering technology, entomology and wildlife conservation, resource economics, agribusiness, natural resource management, and biotechnology. Students develop and practice their leadership skills through participation in FFA activities and other student organizations. Additionally, it provides pedagogical skills in a pragmatic hands-on program that uses an investigative, scientific,

design-and-construct, and problem-solving approach to teaching. The curriculum is designed to allow students to teach in classroom and laboratory settings using modern technology and techniques.

**DEGREE: BACHELOR OF SCIENCE****MAJOR: AGRICULTURAL EDUCATION****CURRICULUM****CREDITS****UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing  
(with minimum grade of C-) 3

First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68) 3

**MAJOR REQUIREMENTS**

**Agricultural and Biological Sciences** 9-12  
Minimum of one course in three of the following areas: Animal and Food Sciences, Engineering Technology, Food and Resource Economics (except FREC 135), Entomology and Wildlife Ecology, Plant and Soil Sciences, Statistics, or Biological Sciences.

**Literature and Arts**

9  
Nine credits from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments.  
Three credits must be in either AGRI 212 or COMM 212.

**Social Sciences and Humanities**

9  
Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

**Physical Sciences**

8  
Minimum of eight credits selected from one of the following two-course sequences:  
CHEM 101/102 or 103/104  
PHYS 201/202 or 207/208

**Professional Studies**

MATH 115	3
AGED 180	3
AGED 280	3
AGED 448	1
AGED 480	3
AGED 481	3
EDUC 413	4
EDUC 414	3
EDUC 419	3
<b>(fulfills the University multicultural requirement)</b>	
EDUC 400	9
EDUC 420	1
EDUC 430	1

**Technical Agriculture**

30  
At least thirty credits of agriculture and natural resources courses from at least three departments in the college. Three credits must be FREC 135. Students are to meet with their Agricultural Education advisor before selecting these courses.

A maximum of three credits of independent study in Food and Resource Economics and a maximum of six credits in all areas, including Food and Resource Economics, may be counted toward the degree.

The Agricultural program requires a 2.5 minimum overall GPA, passing scores on the Praxis I test for all three subtests (reading, passing score=175; writing, passing score=173; and mathematics, passing score=174) prior to enrollment in AGED 480 and AGED 481, and proof of having taken the Praxis II test in the appropriate academic content area. A copy of the official score report must be submitted to the Delaware Center for Teacher Education, 200 Academy Street, during enrollment in EDUC 400 Student Teaching or no later than November 1 for January graduates and May 1 for June or summer graduates. An institutional recommendation for certification will not be issued until the candidate has presented the official score report. The teacher education program advisor should be consulted for other policies concerning qualifications for student teaching. A minimum grade of C is required in all AGED and EDUC courses and an overall major GPA of 3.0 (for all AGED and EDUC courses).

**ELECTIVES**

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only four credits of activity-type Physical Education or performing Music credit may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**ANIMAL AND FOOD SCIENCES**

Telephone: (302) 831-2508

E-mail: kra@udel.edu

http://ag.udel.edu

Faculty Listing: http://ag.udel.edu/anfs/faculty/facultyStaff.htm

The Department of Animal and Food Sciences offers undergraduate programs leading to the Bachelor of Science degree, as well as minor programs in Animal Science and in Food Science and Technology.

The Animal Science major encompasses a wide range of disciplines in which the principles of biology, chemistry and biochemistry are applied to animal agriculture. Instruction is offered in animal nutrition, physiology, genetics, and reproduction; in animal health and molecular biology; and in dairy, livestock and poultry management. The department offers four areas of concentration within the major: preveterinary medicine, animal biotechnology, applied animal science, and general animal science. Students interested in pursuing graduate studies in the animal sciences are well prepared by available course work and laboratory experiences. Students interested in veterinary medicine have the opportunity to obtain preveterinary training required for admission to veterinary school. The preveterinary concentration is designed to meet not only the department, college, and University requirements for the BS degree, but also the admission requirements for many U.S. veterinary schools. Students are encouraged to participate in a broad realm of animal science research projects in the department through independent study/special problems courses. An Honors Degree option is offered for all the concentrations in the Animal Science major.

The Food Science and Technology major is designed to provide students with a broad understanding and professional preparation in the areas of food processing, preservation, evaluation, packaging, and distribution. Upon graduation, job opportunities include positions within the food and allied industries, government, and independent research institutions. The role of the food scientist in such positions may involve product and process development, food safety engineering, quality control and analysis, technical service and sales, with opportunities in regulatory agencies, education, and basic research. Students choose one of two concentrations within the Food Science and Technology major. The Food Science Concentration has a greater emphasis on the biological, chemical and physical sciences, preparing a student for research opportunities within the Food Science disciplines. Additional recommended electives can provide a student with the course work to pursue a food processing engineering emphasis. The Food Technology Concentration provides a curriculum which has less emphasis on the sciences; however, it allows the flexibility to choose minors in related disciplines such as Food and Agribusiness Management or Nutrition or to take courses in Hotel, Restaurant and Institutional Management. An Honors Degree option is offered in the Food Science major for both concentrations.

**DEGREE: BACHELOR OF SCIENCE****MAJOR: ANIMAL SCIENCE****CONCENTRATION: GENERAL ANIMAL SCIENCE****CURRICULUM****CREDITS****UNIVERSITY REQUIREMENTS**

ENGL 110	Critical Reading and Writing (with minimum grade of C-)	3
First Year Experience	(see page 68)	0-4

Discovery Learning Experience	(see page 68)	3
Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content	(see pages 68-70)	3

**MAJOR REQUIREMENTS**

AGRI 165	Mastering the Freshman Year	1
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**Agricultural and Biological Sciences** . . . . . 6-8

Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Entomology and Wildlife Ecology, Statistics, Agriculture, or Plant and Soil Sciences.

**Literature and Arts** . . . . . 6

Six credits from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments.

**Social Sciences and Humanities** . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

MATH 115 or higher		3
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BISC 207/208	Introductory Biology I and II	8
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CHEM 101/102	General Chemistry I and II	
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or		
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CHEM 103/104	General Chemistry I and II	8
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ANSC 101	Introduction to Animal Science	3
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ANSC 111	Animal Science Laboratory	1
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ANSC 140	Functional Anatomy	4
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ANSC 251	Animal Nutrition	3
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ANSC 252	Animal Nutrition Laboratory	1
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ANSC 265	Sophomore Seminar	1
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ANSC 300	Principles of Animal and Plant Genetics	3
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ANSC 332	Introduction to Animal Diseases	3
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One course from the following:		3
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ANSC 441	Reproductive Physiology of Domestic Animals	
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ANSC 442	Lactational Physiology	
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ANSC 445	Comparative Physiology of Domestic Animals	
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BISC 306	General Physiology	
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One course from the following:		4
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ANSC 404	Dairy Production	
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ANSC 417	Beef Cattle and Sheep Production	
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ANSC 418	Swine Production	
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ANSC 421	Poultry Production	
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ANSC 420	Equine Management	
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Elective Animal Science courses for a total of 30 ANSC credits.		4-7
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No more than five credits of ANSC 266, 366, 466, or 666 Special Problem/Independent Study may be used for the major. ANSC 399 may be taken one time for a maximum of 2 credits toward graduation.

**ELECTIVES**

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only four credits of HESC 120 activity or four credits of performing Music credit may be counted toward the degree.

**Recommended Electives**

FREC 201	Records and Accounts
ANSC 270	Biotechnology: Science and Socioeconomic Issues
ANSC 399	Teaching Assistant
BISC 300	Introduction to Microbiology
COMM 350	Public Speaking
ENGL 312	Written Communications in Business

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: ANIMAL SCIENCE**  
**CONCENTRATION: ANIMAL BIOTECHNOLOGY**

**UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing  
 (with minimum grade of C-) . . . . . 3

First Year Experience (see page 68) . . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

Three credits in an approved course or courses stressing multi-cultural, ethnic,  
 and/or gender-related course content (see pages 68-70) . . . . . 3

**MAJOR REQUIREMENTS**

AGRI 165 Mastering the Freshman Year . . . . . 1

**Agricultural and Biological Sciences** . . . . . 6-8

Minimum of one course in two of the following areas: Food and Resource  
 Economics (except FREC 135), Food Science, Engineering Technology, Entomology  
 and Wildlife Ecology (except ENWC 300), or Plant and Soil Sciences (except  
 PLSC 300).

**Literature and Arts** . . . . . 6

Six credits from English, Art, Art History, Communication, Music, Theatre, Foreign  
 Language, or courses cross-listed in these departments.

**Social Sciences and Humanities** . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black  
 American Studies, Criminal Justice, Economics, Education, Geography, History,  
 Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses  
 cross-listed in these departments.

MATH 221 Calculus I . . . . . 3

BISC 207/208 Introductory Biology I and II . . . . . 8

BISC 401 Molecular Biology of the Cell . . . . . 4

CHEM 103/104 General Chemistry I and II . . . . . 8

CHEM 321/322 Organic Chemistry . . . . . 8

One of the following: . . . . . 3-6

CHEM 527 Introductory Biochemistry

CHEM 214/216 Elementary Biochemistry

CHEM 641/642 Biochemistry

PHYS 201/202 Introductory Physics I and II . . . . . 8

ANSC 101 Introduction to Animal Science . . . . . 3

ANSC 111 Animal Science Laboratory . . . . . 1

ANSC 140 Functional Anatomy . . . . . 4

ANSC 251 Animal Nutrition . . . . . 3

ANSC 252 Animal Nutrition Laboratory . . . . . 1

ANSC 265 Sophomore Seminar . . . . . 1

ANSC 270 Biotechnology: Science and Socioeconomic Issues . . . . . 3

ANSC 300 Principles of Animal and Plant Genetics . . . . . 3

ANSC 310 Animal Genetics Laboratory . . . . . 1

ANSC 332 Introduction to Animal Diseases . . . . . 3

ANSC 466 Independent Study . . . . . 3

(Approved research project)

ANSC 470 Principles of Molecular Genetics . . . . . 3

One course from the following: . . . . . 3-4

ANSC 436 Immunology of Domestic Animals

ANSC 445 Comparative Physiology of Domestic Animals

BISC 300 Introduction to Microbiology

One course from the following: . . . . . 4

ANSC 404 Dairy Production

ANSC 417 Beef Cattle and Sheep Production

ANSC 418 Swine Production

ANSC 420 Equine Management

ANSC 421 Poultry Production

**ELECTIVES**

After required courses are completed, sufficient credits must be taken to meet the  
 minimum credits required for the degree.

**Recommended Electives**

ANSC 399 Teaching Assistant

ANSC 424 Nonruminant Nutrition

ANSC 435 Introduction to Animal Virology

ANSC 436 Immunology of Domestic Animals

ANSC 633 Poultry Pathology

ANSC 644 Bioinformatics

ANSC 654 Advanced Ruminant Nutrition

BISC 601 Immunochemistry

BISC 602 Molecular Biology of the Cell

BISC 653 Recent Advances in Molecular Biology

BISC 654 Biochemical Genetics

BISC 658 Developmental Genetics

BISC 679 Virology

BISC 693 Human Genetics

CHEM 220 Quantitative Analysis

CHEM 418 Introductory Physical Chemistry

COMM 350 Public Speaking

ENGL 312 Written Communication in Business

FOSC 439/639 Food Microbiology

FOSC 449/649 Food Biotechnology

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: ANIMAL SCIENCE**

**CONCENTRATION: APPLIED ANIMAL SCIENCE**

**UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing  
 (with minimum grade of C-) . . . . . 3

First Year Experience (see page 68) . . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

Three credits in an approved course or courses stressing multi-cultural, ethnic,  
 and/or gender-related course content (see pages 68-70) . . . . . 3

**MAJOR REQUIREMENTS**

AGRI 165 Mastering the Freshman Year . . . . . 1

**Agricultural and Biological Sciences** . . . . . 6-8

Minimum of one course in two of the following areas: Food and Resource  
 Economics (except FREC 135), Food Science, Engineering Technology, Entomology  
 and Wildlife Ecology (except ENWC 300), or Plant and Soil Sciences (except PLSC 300).

**Literature and Arts** . . . . . 6

Six credits from English, Art, Art History, Communication, Music, Theatre, Foreign  
 Language, or courses cross-listed in these departments.

**Social Sciences and Humanities** . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black  
 American Studies, Criminal Justice, Economics, Education, Geography, History,  
 Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses  
 cross-listed in these departments.

MATH 115 or higher . . . . . 3

BISC 207/208 Introductory Biology I and II . . . . . 8

CHEM 101/102 General Chemistry I and II

or

CHEM 103/104 General Chemistry I and II . . . . . 8

CHEM 213 Elementary Organic Chemistry . . . . . 4

CHEM 214/216 Elementary Biochemistry with Lab . . . . . 4

ENWC 205 Elements of Entomology . . . . . 3

FREC 150 Economics of Agriculture and Natural Resources . . . . . 3

PLSC 151 Introduction to Crop Science . . . . . 3

PLSC 204 Introduction to Soil Science . . . . . 3

ANSC 101 Introduction to Animal Science . . . . . 3

ANSC 111 Animal Science Laboratory . . . . . 1

ANSC 140 Functional Anatomy . . . . . 4

ANSC 251 Animal Nutrition . . . . . 3

ANSC 252 Animal Nutrition Laboratory . . . . . 1

ANSC 265 Sophomore Seminar . . . . . 1

ANSC 300 Principles of Animal and Plant Genetics . . . . . 3

ANSC 332 Introduction to Animal Diseases . . . . . 3

One course from the following: . . . . . 3

ANSC 441 Reproductive Physiology of Domestic Animals

ANSC 442 Lactational Physiology

ANSC 445 Comparative Physiology of Domestic Animals

BISC 306 General Physiology

Two courses from the following: . . . . . 8

ANSC 404	Dairy Production
ANSC 417	Beef Cattle and Sheep Production
ANSC 418	Swine Production
ANSC 420	Equine Management
ANSC 421	Poultry Production

Elective Animal Science courses for a total of 30 ANSC credits. . . . . 0-3

### ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree.

#### Recommended Electives

ANSC 270	Biotechnology: Science and Socioeconomic Issues
ANSC 399	Teaching Assistant
ANSC 420	Equine Management
ANSC 436	Immunology of Domestic Animals
BISC 300	Introduction to Microbiology
COMM 212	Oral Communication in Business
ENGL 312	Written Communications in Business
EGTE 328	Agricultural Waste Management Systems
FREC 350	Farm Management
PLSC 401	Agronomic Crop Science

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: ANIMAL SCIENCE**

**CONCENTRATION: PREVETERINARY MEDICINE**

### UNIVERSITY REQUIREMENTS

ENGL 110	Critical Reading and Writing (with minimum grade of C-) . . . . .	3
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First Year Experience (see page 68). . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . . 3

### MAJOR REQUIREMENTS

AGRI 165	Mastering the Freshman Year . . . . .	1
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#### Agricultural and Biological Sciences . . . . . 6-8

Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Entomology and Wildlife Ecology (except ENWC 300), or Plant and Soil Sciences (except PLSC 300).

#### Literature and Arts . . . . . 6

Six credits from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments.

#### Social Sciences and Humanities . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

MATH 221	Calculus I . . . . .	3
BISC 207/208	Introductory Biology I and II . . . . .	8
BISC 300	Introduction to Microbiology . . . . .	4
CHEM 103/104	General Chemistry I and II . . . . .	8
CHEM 321/322	Organic Chemistry . . . . .	8

One of the following: . . . . . 3-6

CHEM 527	Introductory Biochemistry
CHEM 214/216	Elementary Biochemistry
CHEM 641/642	Biochemistry

PHYS 201/202 Introductory Physics I and II . . . . . 8

ANSC 101	Introduction to Animal Science . . . . .	3
ANSC 111	Animal Science Laboratory . . . . .	1
ANSC 140	Functional Anatomy . . . . .	4
ANSC 251	Animal Nutrition . . . . .	3
ANSC 252	Animal Nutrition Laboratory . . . . .	1
ANSC 265	Sophomore Seminar . . . . .	1
ANSC 300	Principles of Animal and Plant Genetics . . . . .	3
ANSC 310	Animal Genetics Laboratory . . . . .	1
ANSC 332	Introduction to Animal Diseases . . . . .	3
ANSC 445	Comparative Physiology of Domestic Animals . . . . .	3

One course from the following: . . . . . 4

ANSC 404	Dairy Production
ANSC 417	Beef Cattle and Sheep Production
ANSC 418	Swine Production
ANSC 420	Equine Management
ANSC 421	Poultry Production

Elective Animal Science courses for a total of 30 ANSC credits . . . . . 3

### ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree.

#### Recommended Electives

FREC 201	Records and Accounts
ANSC 270	Biotechnology: Science and Socioeconomic Issues
ANSC 399	Teaching Assistant
ANSC 436	Immunology of Domestic Animals
ANSC 635	Introduction to Virology
COMM 212	Oral Communication in Business
ENGL 312	Written Communications in Business
FREC 408	Research Methods

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**HONORS BACHELOR OF SCIENCE:  
ANIMAL SCIENCE**

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Animal Science (any concentration).
2. All the University requirements for the Honors degree (see page 52).  
Courses with the ANSC prefix taken at the 600-level or higher are considered to be Honors courses in the major. One 3-or 4-credit course in PLSC, ENWC, or BISC will, if taken as Honors, count toward the 12 Honors credits required in the major or in collateral disciplines.

### MINOR IN ANIMAL SCIENCE

The minor in animal science requires 19 credits in animal science including: ANSC 101; 111; 140; 251; 252; one course from ANSC 404, 417, 418, 420, and 421; and one course from ANSC 332, 345, 441, 436, and 454.

**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: FOOD SCIENCE AND TECHNOLOGY**

**CONCENTRATION: FOOD SCIENCE**

CURRICULUM . . . . . CREDITS

### UNIVERSITY REQUIREMENTS

ENGL 110	Critical Reading and Writing (with minimum grade of C-) . . . . .	3
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First Year Experience (see page 68). . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . . 3

### MAJOR REQUIREMENTS

AGRI 165	Mastering the Freshman Year . . . . .	1
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#### Agricultural and Biological Sciences . . . . . 3-4

One course in any of the following areas: Engineering Technology, Animal Science, Entomology and Wildlife Ecology, or Plant and Soil Sciences.

#### Literature and Arts . . . . . 6

Six credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments.

#### Social Sciences and Humanities . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

#### Professional Studies

CHEM 103/104	General Chemistry	8
CHEM 214	Elementary Biochemistry	
or		
CHEM 527	Introductory Biochemistry	3
PHYS 201/202	Introductory Physics I and II	8
BISC 207/208	Introductory Biology I and II	8
BISC 300	Introduction to Microbiology	4
CHEM 220	Quantitative Analysis I	3
CHEM 221	Quantitative Analysis Laboratory	1
CHEM 321/322	Organic Chemistry	8
CHEM 418	Introductory Physical Chemistry	3
NTDT 200	Nutrition Concepts	3
MATH 221/222	Calculus I and II	
or		
MATH 241/242	Analytic Geometry and Calculus A and B	6-8
FREC 135	Introduction to Data Analysis	3
FREC 408	Research Methods	3
FOSC 102	Food for Thought	3
FOSC 265	Seminar: Food Science	1
FOSC 305	Food Science	3
FOSC 328	Food Chemistry	4
FOSC 329	Food Analysis	4
FOSC 359	Topics in Food Science	1
FOSC 409	Food Processing	4
FOSC 411	Food Science Capstone	4
FOSC 439	Food Microbiology	4
FOSC 445	Food Engineering Technology	4
FOSC 449	Food Biotechnology	4

A minimum grade of C- must be achieved for credits to count toward the fulfillment of 36 credits in FOSC. A maximum of four credits of Special Problem/Independent Study (FOSC x66) may count toward the fulfillment of the degree. FOSC 399, Teaching Assistant, may be taken one time allowing a maximum of 2 credits toward graduation.

### ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only two credits of HESC 120 activity, four credits of Music credits, or four credits of 100 and 200 level courses in Military Science/Air Force may be counted toward the degree.

### Recommended Electives

CHEM 419	Introductory Physical Chemistry
CHEM 445	Physical Chemistry Laboratory

### CREDITS TO TOTAL A MINIMUM OF . . . . . 124

## DEGREE: BACHELOR OF SCIENCE MAJOR: FOOD SCIENCE AND TECHNOLOGY CONCENTRATION: FOOD TECHNOLOGY

CURRICULUM	CREDITS
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### UNIVERSITY REQUIREMENTS

ENGL 110	Critical Reading and Writing (with minimum grade of C-) . . . . .	3
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First Year Experience (see page 68) . . . . .	0-4
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Discovery Learning Experience (see page 68) . . . . .	3
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Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . .	3
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### MAJOR REQUIREMENTS

AGRI 165	Mastering the Freshman Year . . . . .	1
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### Agricultural and Biological Sciences . . . . . 3-4

One course from any of the following areas: Engineering Technology, Animal Science, Entomology and Wildlife Ecology, or Plant and Soil Sciences.

### Literature and Arts . . . . . 6

Six credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or any courses cross-listed in these departments.

### Social Sciences and Humanities . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or any courses cross-listed in these departments.

### Professional Studies

CHEM 101/102	General Chemistry	8
CHEM 213	Elementary Organic Chemistry	4
CHEM 214/216	Elementary Biochemistry with Lab	4
CHEM 220	Quantitative Analysis	3
CHEM 221	Quantitative Analysis Laboratory	1
PHYS 104	Elementary Physics	3
BISC 207/208	Introductory Biology I and II	8
BISC 300	Introduction to Microbiology	4
NTDT 200	Nutrition Concepts	3
MATH 221/222	Calculus I and II	6
FREC 135	Introduction to Data Analysis	3
FREC 408	Research Methods	3
FOSC 102	Food for Thought	3
FOSC 265	Seminar: Food Science	1
FOSC 305	Food Science	3
FOSC 328	Food Chemistry	4
FOSC 329	Food Analysis	4
FOSC 359	Topics in Food Science	1
FOSC 409	Food Processing	4
FOSC 411	Food Science Capstone	4
FOSC 439	Food Microbiology	4
FOSC 445	Food Engineering Technology	4
FOSC 449	Food Biotechnology	4

A minimum grade of C- must be achieved for credits to count toward the fulfillment of 36 credits in FOSC. A maximum of four credits of Special Problem/Independent Study (FOSC x66) may count toward the fulfillment of the degree. FOSC 399, Teaching Assistant, may be taken one time allowing a maximum of 2 credits toward graduation.

### ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only two credits of HESC activity, four credits of Music credits, or four credits of 100 and 200 level courses in Military Science/Air Force may be counted toward the degree.

### CREDITS TO TOTAL A MINIMUM OF . . . . . 124

## HONORS BACHELOR OF SCIENCE: FOOD SCIENCE AND TECHNOLOGY

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Food Science and Technology (either concentration).
2. All the University requirements for the Honors degree (see page 52).  
Courses in Food Science taken at the 600-level or higher are considered to be Honors courses in the major. One 3- or 4-credit required course in a related technical area will, if taken as Honors, count toward the total of Honors credits required in the major or in collateral disciplines.

### MINOR IN FOOD SCIENCE

The minor in food science requires 15 food science credits. Course selection depends on completion of prerequisites and other science and math preparation.

1. The minor in Food Science requires a minimum of 15 food science credits, including FOSC 305 and any 3 other FOSC courses above the 300 level.
2. A C grade or 2.00 or higher is required in all FOSC courses.
3. Successful completion of MATH 221/222 Calculus I and II (6 credits) mathematics courses is required prior to taking food science courses for the minor.

FOSC 305	Food Science . . . . .	3
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Select any 3 courses from: . . . . . 12

FOSC 328	Food Chemistry
FOSC 329	Food Analysis
FOSC 409	Food Processing
FOSC 411	Food Science Capstone
FOSC 439	Food Microbiology
FOSC 445	Food Engineering Technology
FOSC 449	Food Biotechnology

Prerequisites may be waived. Permission of instructor to register is based on individual student academic record and major. See a food science faculty member for advisement.

### CREDITS TO TOTAL A MINIMUM OF . . . . . 15

**BIORESOURCES ENGINEERING**

Telephone: (302)831-2468  
 http://ag.udel.edu  
 Faculty Listing: http://ag.udel.edu/breg/faculty/facultyStaff.htm

The Bioresources Engineering Department offers an undergraduate major in Engineering Technology that is accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology (TAC of ABET).

**ENGINEERING TECHNOLOGY**

Engineering technology is part of the broad discipline of engineering, in which knowledge of the mathematical and natural sciences is applied in utilization of materials and forces. Engineering technology requires the application of scientific and engineering knowledge combined with technical skills in support of engineering activities. The curriculum prepares the engineering technologist to make independent judgments and to design and manage systems and components to achieve conceptual goals with consideration of their effectiveness, safety and cost. Close liaison is maintained between the educational programs and employers to give graduates the greatest opportunity for career development.

Within the major in engineering technology, two optional concentrations are available. The applied electronics and controls concentration includes coursework in digital systems, instrumentation, controls, PLC's, and courses that focus on communication and networks, or manufacturing. The construction technology and technical management concentration provides courses in soil mechanics, storm water management, wood and steel and concrete and masonry as well as courses in project management and economic analysis. Both concentrations allow the student to focus their studies with more in-depth courses in areas of their interest.

Students who choose the engineering technology major may take all the necessary courses at the University of Delaware or they may transfer appropriate course work from other accredited institutions. Students who wish to have prior course work considered must contact an advisor in the department for a degree analysis.

Computer use for problem solving is important throughout the engineering technology curriculum. Students are urged to have their own computer with spreadsheet and word processing software, and should be able to connect to the University computer network.

**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: ENGINEERING TECHNOLOGY**

CURRICULUM CREDITS

**UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing . . . . . 3

First Year Experience (see page 68) . . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70). 3

**MAJOR REQUIREMENTS**

EGTE 165 New Student Seminar . . . . . 0

**Communications**

A second writing course selected from: . . . . . 3

ENGL 301 Expository Writing

ENGL 302 Advanced Composition

ENGL 307 News Writing and Editing

ENGL 312 Written Communications in Business

ENGL 410 Technical Writing

An oral communications course selected from: . . . . . 3

COMM 255 Fundamentals of Communication  
 COMM 212 Oral Communication in Business  
 COMM 350 Public Speaking  
 AGRI 212 Oral Communications in Agriculture and Natural Resources

**Social Sciences and Humanities**

ECON 151 Introduction to Microeconomics . . . . . 3  
 ECON 152 Introduction to Macroeconomics . . . . . 3

Six additional credits to be selected from . . . . . 6

Anthropology, Art, Art History, Black American Studies, Criminal Justice, Economics, Education, English, Foreign Language, Geography, History, Music, Philosophy, Political Science, Psychology, Sociology, Theatre, Women's Studies, or courses cross-listed in these departments.

**Basic Sciences and Mathematics**

Biology/Life Science course . . . . . 3 or 4

CHEM 103/104 General Chemistry . . . . . 8

PHYS 201/202 Introductory Physics I and II

or

PHYS 207/208 Fundamentals of Physics I and II (recommended). . . . . 8

MATH 117 Precalculus for Scientists and Engineers . . . . . 4

MATH 221/222 Calculus I and II (with permission of advisor)

or

MATH 241/242 Calculus A and B . . . . . 6 or 8

Additional MATH course to bring total MATH credits at 201 level above to 12 credits . . . . . 4 or 6

**Technical Skills**

EGTE 115 Introduction to Computer Based Problem Solving . . . . . 4

EGTE 209 Technical and Computer Aided Drafting . . . . . 3

Technical Skills elective . . . . . 3

**Technical Sciences**

EGTE 215 Applied Fluid Mechanics . . . . . 4

EGTE 231 Fundamentals of Statics and Strength of Materials . . . . . 4

EGTE 244 Electricity for Engineering Technology . . . . . 4

EGTE 311 Fundamentals of Thermodynamics . . . . . 3

**Technical Specialization**

25 to 31 credits of EGTE or engineering courses at the 300 or 400 level from a departmental approved list including a 3 credit capstone experience selected from EGTE 450, EGTE 451, EGTE 466 or UNIV 401/402. At least 15 credits must be EGTE courses. A minor in a technical or business subject area is strongly encouraged. With a minor, the requirements for a technical specialization are a minimum of 25 credits . . . . . 31 to 25

**Technical Support**

9 to 15 credits of course work selected to support the student's career objectives. Subject to approval of the faculty. . . . . 9 to 15

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

Enrollment in EGTE 300 and 400 level courses is limited to majors with Junior or Senior standing, or permission of the instructor.

To graduate with a major in engineering technology, a student must attain at least a 2.0 average in EGTE courses and must earn at least a C- in all prerequisite courses to qualify for admission to the next course. This requirement is in addition to the University requirement of a 2.0 grade point average. A student must complete a minimum of 48 semester hours in technical sciences, technical skills and technical specialization.

**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: ENGINEERING TECHNOLOGY**  
**CONCENTRATION: APPLIED ELECTRONICS AND CONTROLS**

CURRICULUM CREDITS

**UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing . . . . . 3

First Year Experience (see page 68) . . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70). 3

**MAJOR REQUIREMENTS**

EGTE 165	New Student Seminar	0
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**Communications**

A second writing course selected from:		3
ENGL 301	Expository Writing	
ENGL 302	Advanced Composition	
ENGL 307	News Writing and Editing	
ENGL 312	Written Communications in Business	
ENGL 410	Technical Writing	

An oral communications course selected from:		3
COMM 255	Fundamentals of Communication	
COMM 212	Oral Communication in Business	
COMM 350	Public Speaking	
AGRI 212	Oral Communications in Agriculture and Natural Resources	

**Social Sciences and Humanities**

ECON 151	Introduction to Microeconomics	3
ECON 152	Introduction to Macroeconomics	3

Six additional credits to be selected from ..... 6  
 Anthropology, Art, Art History, Black American Studies, Criminal Justice, Economics, Education, English, Foreign Language, Geography, History, Music, Philosophy, Political Science, Psychology, Sociology, Theatre, Women's Studies, or courses cross-listed in these departments.

**Basic Sciences and Mathematics**

Biology/Life Science course		3 or 4
CHEM 103/104	General Chemistry	8
PHYS 201/202	Introductory Physics I and II	
or		
PHYS 207/208	Fundamentals of Physics I and II (recommended)	8
MATH 117	Precalculus for Scientists and Engineers	4
MATH 221/222	Calculus I and II (with permission of advisor)	
or		
MATH 241/242	Calculus A and B	6 or 8

Additional MATH credits to bring total MATH credits  
 at 201 level above to 12 credits ..... 4 or 6

**Technical Skills**

EGTE 115	Introduction to Computer Based Problem Solving	4
MEEG 202	Computer-Aided Engineering Design	3

**Technical Sciences**

EGTE 215	Applied Fluid Mechanics	4
EGTE 231	Fundamentals of Statics and Strength of Materials	4
EGTE 244	Electricity for Engineering Technology	4
EGTE 311	Fundamentals of Thermodynamics	3

**Technical Specialization**

CPEG 202	Introduction to Digital Systems	4
EGTE 245	Analog Electronics	3
EGTE 443	Instrumentation	3
EGTE 444	PLC Applications	3
EGTE 449	Applied Controls	3

Technical Specialization electives including a 3 credit capstone experience selected from EGTE 450, EGTE 451, EGTE 466 or UNIV 401/402, with a focus in an area such as computer architecture, communication and networks, or manufacturing, subject to approval by the student's faculty advisor. A University minor may also be selected as the focus ..... 16

**Technical Support**

An additional computer programming language		3
Approved Technical Support Electives		8

**CREDITS TO TOTAL A MINIMUM OF ..... 124**

Enrollment in EGTE 300 and 400 level courses is limited to majors with Junior or Senior standing, or permission of the instructor.

To graduate with a major in engineering technology, a student must attain at least a 2.0 average in EGTE courses and must earn at least a C- in all prerequisite courses to qualify for admission to the next course. This requirement is in addition to the University requirement of a 2.0 grade point average. A student must complete a minimum of 48 semester hours in technical sciences, technical skills and technical specialization.

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**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: ENGINEERING TECHNOLOGY**  
**CONCENTRATION: CONSTRUCTION TECHNOLOGY AND TECHNICAL MANAGEMENT**

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**CURRICULUM**

CREDITS

**UNIVERSITY REQUIREMENTS**

ENGL 110	Critical Reading and Writing	3
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First Year Experience (see page 68) ..... 0-4

Discovery Learning Experience (see page 68) ..... 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70). 3

**MAJOR REQUIREMENTS**

EGTE 165	New Student Seminar	0
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**Communications**

A second writing course selected from:		3
ENGL 301	Expository Writing	
ENGL 302	Advanced Composition	
ENGL 307	News Writing and Editing	
ENGL 312	Written Communications in Business	
ENGL 410	Technical Writing	

An oral communications course selected from:		3
COMM 255	Fundamentals of Communication	
COMM 212	Oral Communication in Business	
COMM 350	Public Speaking	
AGRI 212	Oral Communications in Agriculture and Natural Resources	

**Social Sciences and Humanities**

ECON 151	Introduction to Microeconomics	3
ECON 152	Introduction to Macroeconomics	3

Six additional credits to be selected from ..... 6  
 Anthropology, Art, Art History, Black American Studies, Criminal Justice, Economics, Education, English, Foreign Language, Geography, History, Music, Philosophy, Political Science, Psychology, Sociology, Theatre, Women's Studies, or courses cross-listed in these departments.

**Basic Sciences and Mathematics**

Biology/Life Science course		3 or 4
CHEM 103/104	General Chemistry	8
PHYS 201/202	Introductory Physics I and II	
or		
PHYS 207/208	Fundamentals of Physics I and II (recommended)	8
MATH 117	Precalculus for Scientists and Engineers	4
MATH 221/222	Calculus I and II (with permission of advisor)	
or		
MATH 241/242	Calculus A and B	6 or 8

Additional MATH credits to bring total MATH credits  
 at 201 level above to 12 credits ..... 4 or 6

**Technical Skills**

EGTE 104	Introduction to Surveying	1
EGTE 115	Introduction to Computer Based Problem Solving	4
EGTE 209	Technical and Computer-Aided Drafting	3
EGTE 223	Surveying	3

**Technical Sciences**

EGTE 215	Applied Fluid Mechanics	4
EGTE 231	Fundamentals of Statics and Strength of Materials	4
EGTE 244	Electricity for Engineering Technology	4
EGTE 311	Fundamentals of Thermodynamics	3

**Technical Specialization**

EGTE 312	Fundamentals of Soil Mechanics	3
EGTE 321	Storm Water Management	4
EGTE 416	Project Economic Analysis	3
EGTE 417	Project Management	3
EGTE 454	Wood and Steel Structures	3
EGTE 455	Concrete and Masonry Structures	3
Approved Technical Specialization electives		12
Technical Specialization electives will include a 3 credit capstone experience selected from EGTE 450, EGTE 451, EGTE 466 or UNIV 401/402.		



**Technical Support**

ACCT 207 or FREC 201 . . . . . 3

Technical Support electives appropriate to the student's professional goals, subject to approval by the student's faculty advisor . . . . . 5

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

Enrollment in EGTE 300 and 400 level courses is limited to majors with Junior or Senior standing, or permission of the instructor.

To graduate with a major in engineering technology, a student must attain at least a 2.0 average in ETGE courses and must earn at least a C- in all prerequisite courses to qualify for admission to the next course. This requirement is in addition to the University requirement of a 2.0 grade point average. A student must complete a minimum of 48 semester hours in technical sciences, technical skills and technical specialization.

**MINOR IN ENGINEERING TECHNOLOGY**

A minor in engineering technology may be earned by a student in any University bachelor degree program through successful completion of a minimum of 20 credits in engineering technology courses in accordance with the requirements listed here. Before taking each engineering technology course, the student must satisfy required prerequisites for the course. A grade point average of at least 2.0 is required in the 20 credits of engineering technology courses for the minor.

The required engineering technology courses are:

EGTE 115 Introduction to Computer Based Problem Solving . . . . . 4

One course from the following list:

EGTE 215 Applied Fluid Mechanics . . . . . 4  
EGTE 231 Fundamentals of Statics and Strength of Materials . . . . . 4  
EGTE 244 Electricity for Engineering Technology . . . . . 4

Furthermore, additional courses must be completed so that EGTE credits total 20, of which at least 6 credits must be at the 300-level or above. All engineering technology courses shall be selected with the approval of an advisor in the Department of Bioresources Engineering to meet each student's objectives. For students interested in environmental issues, courses could include: EGTE 103, 104, 215, and 328; for those interested in electronics: EGTE 244, 245, 443, 444, and 449. For students interested in construction technology, courses could include: EGTE 104, 223, 312, 416, 454, 455 and 456. Courses can also be chosen to give the student's minor an emphasis in other areas such as manufacturing or management.

**ENTOMOLOGY AND WILDLIFE ECOLOGY**

Telephone: (302) 831-2508

E-mail: kra@udel.edu

http://ag.udel.edu

Faculty Listing: http://ag.udel.edu/enwc/faculty/facultyStaff.htm

Entomology emphasizes the structure, physiology, behavior, development, ecology, classification, and management of insects. Wildlife ecology broadly includes the biology and ecology of all species and their conservation. Wildlife conservation is the broad effort to perpetuate free-living, breeding populations of species in their native habitats. The department views all non-domesticated species as wildlife.

The Department offers two undergraduate majors. Students can focus their biological interest on insects in the Entomology major. This program requires basic sciences as well as specialty courses on insects. Flexibility in course selection permits students to emphasize pest management or insect biology. The Wildlife Conservation major is for students with interests in the biological aspects of environmental science, e.g., conservation, wildlife biology, or ecology. It requires basic sciences, specialty courses in vertebrates, insects, plants, and conservation and other supporting areas. The curriculum's flexibility accommodates career goals ranging from research to nature education, conservation advocacy and wildlife management. Meeting the requirements for the Wildlife Conservation major should provide the student with the minimum educational

requirements for certification as an Associate Wildlife Biologist by The Wildlife Society, a professional society. An Honors Degree option is offered for both majors. The department also offers minors in both Entomology and Wildlife Conservation and co-offers Natural Resource Management and Plant Protection as interdisciplinary majors.

The faculty advisor and student jointly plan the course program according to the student's interests and career objective. Course selection should be made in consultation with the academic advisor during the preregistration period of each term.

University of Delaware students in other majors who wish to transfer to or add entomology or wildlife conservation majors must have a UD grade point average of at least 2.25. In addition, completion of the major must be the stated intention of the student and a realistic possibility before the student's intended graduation date. Students with a GPA below 2.25 are invited to contact the department for advisement on course selection appropriate to the desired major while improving their GPA.

**DEGREE: BACHELOR OF SCIENCE  
MAJOR: ENTOMOLOGY****CURRICULUM****CREDITS****UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing  
(with minimum grade of C-) . . . . . 3

First Year Experience (see page 68) . . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . . 3

**MAJOR REQUIREMENTS****Computer Science**

Computer Science course (FREC 135 or equivalent) . . . . . 3

**Agricultural and Biological Sciences** . . . . . 6-8

Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Animal Science (except ANSC 300), Statistics, Agriculture, or Plant and Soil Sciences.

**Literature and Arts** . . . . . 6

Six credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed with these departments.

**Social Sciences and Humanities** . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed with these departments.

**A minimum grade of C- is required for all ENWC credits used to satisfy departmental requirements.**

**Professional Studies**

MATH 115 Pre-Calculus or higher level. . . . . 3  
BISC 207 Introductory Biology I. . . . . 4  
BISC 208 Introductory Biology II . . . . . 4  
BISC 302 General Ecology . . . . . 3

CHEM 101/102 General Chemistry  
or  
CHEM 103/104 General Chemistry . . . . . 8  
ENWC 165 New Student Seminar . . . . . 1  
ENWC 205 Elements of Entomology . . . . . 3  
ENWC 215 Entomology Laboratory . . . . . 2  
ENWC 300 Principles of Animal and Plant Genetics . . . . . 3  
ENWC 405 Insect Structure and Function . . . . . 4  
ENWC 406 Insect Identification-Taxonomy . . . . . 3  
ENWC 408 Field Taxonomy . . . . . 3  
ENWC 465 Senior Capstone Experience . . . . . 1

ENWC courses (may include 3 credits maximum of Independent Study, Research, and must include one regularly scheduled course with content focused on insects;

Field Experience.) . . . . .	6
Nine credits from any of the following: . . . . .	9
Any BISC XXX course or courses at or above 300-level (except BISC 302 and 321)	
PLSC 151 Introduction to Crop Science	
PLSC 201 Botany II	
PLSC 204 Introduction to Soil Science	
PLSC 211 Herbaceous Landscape Plants	
PLSC 212 Woody Landscape Plants	
PLSC 303 Introductory Plant Pathology	
PLSC 404 Plant Taxonomy	

## ELECTIVES

Beyond required courses, sufficient credits must be taken to meet the minimum credits required for the degree. Organic chemistry, biochemistry, statistics, physics, and additional writing courses are strongly recommended. Only two credits of HESC activity or performing music may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

## PLANT PROTECTION

Because of mutual interests and problems in the field of pest management, the Department of Entomology and Wildlife Ecology and the Department of Plant and Soil Sciences offer a joint major, Plant Protection. In a world of expanding human population and increasing pressure on supplies of food and fiber, studies in plant pathology, entomology, and weed science can lead to a challenging and satisfying career that contributes to human welfare. This combined major allows students to study applied and basic aspects of insects, plant diseases, and weeds. Courses and field experience emphasize recognition of pests and their symptoms and strategies for pest management compatible with agriculture and the environment.

## DEGREE: BACHELOR OF SCIENCE MAJOR: PLANT PROTECTION

CURRICULUM	CREDITS
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### UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (with a minimum grade of C-) . . . . .	3
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First Year Experience (see page 68) . . . . .	0-4
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Discovery Learning Experience (see page 68) . . . . .	3
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Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . .	3
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### MAJOR REQUIREMENTS

#### Computer Science

Computer Science course (FREC 135 or equivalent) . . . . .	3
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#### Agricultural and Biological Sciences . . . . . 6-8

Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Animal Science, Entomology and Wildlife Ecology, Statistics, Agriculture or Plant and Soil Sciences.

#### Literature and Arts . . . . . 6

Six credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed with these departments.

#### Social Sciences and Humanities . . . . . 9

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed with these departments.

#### Professional Studies

MATH 115 Pre-Calculus or higher level. . . . .	3
BISC 207/208 Introductory Biology I and II . . . . .	8
CHEM 101/102 General Chemistry	
or	
CHEM 103/104 General Chemistry . . . . .	8
ENWC 205 Elements of Entomology . . . . .	3
ENWC 305 Entomology Laboratory . . . . .	2
ENWC 406 Insect Identification—Taxonomy. . . . .	3

ENWC 411 Insect Pest Management . . . . .	3
ENWC 465 Senior Capstone Experience . . . . .	1
PLSC 101 Botany I . . . . .	4
PLSC 201 Botany II. . . . .	4
PLSC 303 Introductory Plant Pathology . . . . .	4
PLSC 411 Diagnostic Plant Pathology . . . . .	3

A plant production course selected from PLSC 105, 133, or 302 . . . . .	3-4
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Nine additional ENWC and/or PLSC credits plus 3 credits of related Internship, Independent Study, Research or Field Experience. . . . . 12

## ELECTIVES

Beyond required courses, sufficient credits must be taken to meet the minimum credits required for the degree. Courses in agriculture, biology, statistics, and the physical sciences and additional writing courses are recommended. Only two credits of HESC activity or performing music may be counted toward the degree.

The choice of department in which to complete the remaining credits provides the student with the opportunity to emphasize applied entomology, plant pathology, or weed science in his or her program. Students should complete their programs with electives that will provide an education best suited to their goals. Course selection should be made in consultation with the academic advisor during the preregistration period of each term.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

## DEGREE: BACHELOR OF SCIENCE MAJOR: WILDLIFE CONSERVATION

CURRICULUM	CREDITS
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### UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (with minimum grade of C-) . . . . .	3
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First Year Experience (see page 68) . . . . .	0-4
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Discovery Learning Experience (see page 68) . . . . .	3
---	---

Three credits in an approved course or courses stressing multi cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . .	3
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### MAJOR REQUIREMENTS

Computer Science course (FREC 135 or equivalent) . . . . .	3
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#### Agricultural and Biological Sciences . . . . . 3-4

One course in any of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, or Animal Science (except ANSC 300).

#### Literature and Arts . . . . . 3

Three credits (not from Group II) from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed with these departments.

#### Social Sciences and Humanities . . . . . 9

Minimum of one course (not from Group III) in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed with these departments.

A minimum grade of C- is required for all ENWC credits used to satisfy departmental requirements.

#### Professional Studies

MATH 115, 221, or 241 . . . . .	3-4
BISC 207/208 Introductory Biology I and II . . . . .	8
BISC 302 General Ecology . . . . .	3
CHEM 101/102 General Chemistry	
or	
CHEM 103/104 General Chemistry . . . . .	8
ENWC 165 New Student Seminar . . . . .	1
ENWC 201 Wildlife Conservation and Ecology . . . . .	3
ENWC 205 Elements of Entomology . . . . .	3
ENWC 300 Principles of Animal and Plant Genetics . . . . .	3
or	
BISC 403 Genetics and Evolutionary Biology . . . . .	3
ENWC 325 Wildlife Management . . . . .	3
ENWC 406 Insect Identification—Taxonomy . . . . .	3
ENWC 415 Wildlife Research Techniques . . . . .	3
ENWC 418 Ornithology . . . . .	3
ENWC 425 Mammalogy . . . . .	3

ENWC 465	Senior Capstone Experience . . . . .	1
ENWC credit	(may include UNIV 400 or any ENWC course 200-level or above (except X66 and x68) May double count with Group I or III as appropriate) . . . . .	3
ECON 151	Introduction to Microeconomics: Prices and Markets . . . . .	3
	(may double count in Soc. Sci. Group)	
or		
FREC 150	Economics of Agriculture and Natural Resources . . . . .	3
	(may double count for Ag & Biological Sciences Group)	
FREC 408	Research Methods I . . . . .	3
or		
STAT 200	Basic Statistical Practice . . . . .	3
PLSC 101	Botany I . . . . .	4
PLSC 204	Introduction to Soil Science . . . . .	3
PLSC 212	Woody Landscape Plants . . . . .	4
or		
PLSC 344	Forest Ecology (same as ENWC 344) . . . . .	2
or		
PLSC 404	Plant Taxonomy . . . . .	3
<b>GROUP I:</b>	10 credits from the following . . . . .	10
ANSC 140	Functional Anatomy of Domestic Animals	
BISC 300	Introduction to Microbiology	
BISC 305	Cell Physiology	
BISC 306	General Physiology	
BISC 442	Vertebrate Morphology	
BISC 480	Vertebrate Natural History	
BISC 495	Evolution	
BISC 637	Population Ecology	
ENWC 310	Animal and Plant Genetics Laboratory	
ENWC 408	Insect Field Taxonomy	
ENWC 424	Herpetology	
ENWC 444	Conservation of Tropical Biodiversity	
ENWC 452	Conservation of African Wildlife	
MAST 627	Marine Biology	
MAST 629	Ichthyology	

<b>GROUP II:</b>	9 credits from the following: . . . . .	9
AGRI 212	Oral Communication in Agriculture and Natural Resources	
COMM 212	Oral Communication in Business	
COMM 350	Public Speaking	
ENGL 301	Expository Writing	
ENGL 307	News Writing and Editing	
ENGL 309	Feature and Magazine Writing	
ENGL 312	Written Communications in Business	
ENGL 410	Technical Writing	
THEA 204	Introduction to Voice and Speech	
UNIV 402	Senior Thesis (requires completed thesis)	

<b>GROUP III:</b>	6 credits from the following: . . . . .	6
ENWC 413	Human Dimensions in Wildlife Conservation	
ENWC 450	Debates in Conservation Biology	
ENWC 453	Community-based Conservation	
FREC 444	Economics of Environmental Management	
FREC 450	Topics in Environmental Law	
GEOG 236	Conservation: Global Issues	
PHIL 448	Environmental Ethics	
POSC 350	Politics and the Environment	

### ELECTIVES

Beyond required courses, sufficient credits must be taken to meet the minimum credits required for the degree. Calculus, organic chemistry, biochemistry, geographic information systems, and physics are strongly recommended. Only two credits of HESC 120 activity or performing music may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

### HONORS BACHELOR OF SCIENCE: ENTOMOLOGY OR WILDLIFE CONSERVATION

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Entomology or Wildlife Conservation.
2. All of the University's requirements for the Honors Baccalaureate degree (see page 52). Courses with the ENWC prefix taken at the 600-level or higher may be counted as Honors courses in the major. One 3- or 4-credit course in ANSC, PLSC, or BISC will, if taken as Honors, count toward the 12 Honors credits required in the major and/or in collateral disciplines.

### MINOR IN ENTOMOLOGY

The minor in entomology requires 16 credits of ENWC courses including ENWC 205, 215, 406, and at least 6 additional credits from courses focused primarily on insects. A minimum grade of C- is required in all courses counting toward the minor. Credits for Special Problem, Independent Study, Research, and Field Experience do not count toward the minor.

### MINOR IN WILDLIFE CONSERVATION

The minor in wildlife conservation requires 18 credits of ENWC courses including ENWC 201, 205, 325 and one course from among ENWC 418, 424, and 425. Additionally, BISC 302 is a prerequisite for ENWC 325 and this prerequisite is strictly enforced. Any substitutions require prior approval of the Department Chair. A minimum grade of C- is required in all courses counting toward the minor. Credits for Special Problem, Independent Study, Research, and Field Experience do not count toward the minor. Admission to the Minor in Wildlife Conservation requires: (1) a minimum GPA of 2.75; (2) prior completion or current enrollment in ENWC 201; and (3) at least 45 credits of coursework remaining to complete the BS or BA, independent of the minor. Students should note that WC majors have priority and sometimes may fill some courses required for the minor. Therefore, the Department cannot guarantee that a student will be able to complete all courses necessary or desired for the minor.

### FOOD AND RESOURCE ECONOMICS

Telephone: (302) 831-1318

E-mail: [hastings@udel.edu](mailto:hastings@udel.edu)

<http://ag.udel.edu>

Faculty Listing: <http://ag.udel.edu/frec/faculty/facultyStaff.htm>

Food and Resource Economics is concerned with agribusiness management, food marketing, and the economics of resource management and production. Courses are designed to provide a thorough background in the principles of organization and management of agribusiness firms, and includes study of financing agricultural business firms, marketing and international trade of agricultural products, price analyses, economics of land use, and agricultural and environmental policies.

Undergraduate majors are offered in Food and Agribusiness Management, Resource Economics, and Statistics. The curricula differ in the amount of emphasis given to agricultural production, business and economics. All the curricula may qualify the student for graduate work. The department also co-offers Natural Resource Management, an interdisciplinary major. Minors in Food and Agribusiness Management, Resource Economics, Statistics, and Operations Research are also available.

The major in food and agribusiness management is offered cooperatively with the Alfred Lerner College of Business and Economics. This curriculum prepares the student for a career in agribusiness sales and marketing, food wholesaling and retailing, international trade, resource management, market analysis, finance and banking, or commodity marketing (futures and options). A concentration in food marketing is offered.

The major in resource economics emphasizes theory, quantitative methods, and policy, and provides a solid foundation in economics and business. It prepares the student to work in the fields of agriculture, government, teaching, extension and research. A concentration in environmental economics is offered as part of the resource economics major.

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**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: FOOD AND AGRIBUSINESS MANAGEMENT**


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**CURRICULUM** CREDITS
**UNIVERSITY REQUIREMENTS**

 ENGL 110 Critical Reading and Writing  
 (minimum grade C-) . . . . . 3

First Year Experience (see page 68) . . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

 Three credits in an approved course or courses stressing multi-cultural, ethnic,  
 and/or gender-related course content (see pages 68-70) . . . . . 3

**MAJOR REQUIREMENTS**
**Agricultural and Biological Sciences** . . . . . 9

 Minimum of one course in three of the following areas: Engineering Technology,  
 Animal Science, Food Science, Entomology and Wildlife Ecology, Plant and Soil  
 Sciences, or Biology.

**Social Sciences and Humanities** . . . . . 6

 Minimum of one course in two of the following areas: Anthropology, Black  
 American Studies, Criminal Justice, Education, Geography, History, Philosophy,  
 Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed  
 in these departments.

**Physical Sciences** . . . . . 8

 Minimum of eight credits of lab science selected from Chemistry, Physics, Geology,  
 or Physical Science.

**Professional Studies**

 MATH 115 Pre-Calculus or higher level (MATH 221, MATH 230,  
 and MATH 201 are strongly recommended) . . . . . 3

ACCT 207/208 Accounting I and II . . . . . 6

COMM 212 Oral Communication in Business . . . . . 3

ENGL 312 Written Communications in Business . . . . . 3

ECON 151 Introduction to Microeconomics: Prices and Markets . . . . . 3

ECON 152 Introduction to Macroeconomics: National Economy . . . . . 3

BUAD 301 Introduction to Marketing . . . . . 3

 Two additional courses offered by the College of Business and Economics at the  
 300 or 400 level. . . . . 6

One foreign language course . . . . . 3-4

AGRI 165 Mastering the Freshman Year . . . . . 1

FREC 110 Introduction to Food and Agribusiness Industry . . . . . 1

FREC 135 Introduction to Data Analysis . . . . . 3

FREC 150 Economics of Agriculture and Natural Resources . . . . . 3

FREC 240 Quantitative Methods in Agricultural Economics . . . . . 3

FREC 305 Management and Leadership Development . . . . . 3

FREC 316 Economics of Biotechnology and New Technologies . . . . . 3

FREC 345 Strategic Selling and Buyer Communication . . . . . 3

FREC 404 Food and Fiber Marketing . . . . . 3

FREC 408 Research Methods I . . . . . 3

FREC 409 Research Methods II . . . . . 3

FREC 410 International Agricultural Trade and Marketing . . . . . 3

 FREC 430 Establishing and Managing a Food  
 and Agribusiness Enterprise . . . . . 3

 A maximum of three credits of Independent Study in Food and Resource Economics  
 and a maximum of six credits of Independent Study in all areas, including Food  
 and Resource Economics, may be counted toward a degree. MATH 221 or higher  
 (with a minimum grade of C+) can be used as a substitute course for MATH 115  
 and FREC 240.

**ELECTIVES**

 After required courses are completed, sufficient credits must be taken to meet the  
 minimum credits required for the degree. Only four credits of HESC 120 activity or  
 four credits of performing Music credit may be counted toward the degree.

## Suggested Food and Agribusiness Management Electives:

 FREC 212 Food Retailing and Consumer Behavior  
 FREC 335 Advanced Data Management  
 FREC 427 Agribusiness Financial Management  
 FREC 464 Agribusiness Internship  
 FREC 471 Futures and Options Markets

## Suggested Resource Management Electives:

 FREC 406 Agriculture and Natural Resource Policy  
 FREC 424 Resource Economics  
 FREC 429 Community Economic Development

 FREC 444 Economics of Environmental Management  
 FREC 480 Geographic Information Systems in Natural Resource Management

## Suggested Communications and Writing Electives:

 ENGL 301 Expository Writing  
 ENGL 410 Technical Writing

**CREDITS TO TOTAL A MINIMUM OF . . . . . 128**


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**HONORS BACHELOR OF SCIENCE:**  
**FOOD AND AGRIBUSINESS MANAGEMENT**

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Food and Agricultural Business Management.
2. All the University requirements for the Honors degree (see page 52).  
 Courses at the 600-level that satisfy requirements for the major will be considered to be honors courses for the degree.

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**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: FOOD AND AGRIBUSINESS MANAGEMENT**  
**CONCENTRATION: FOOD MARKETING**

The requirements for the major in Food and Agribusiness Management must be met. The following department courses are required for the concentration and may also be used as electives in the Food and Agribusiness Management major:

 FREC 212 Food Retailing and Consumer Behavior . . . . . 3  
 FREC 335 Advanced Data Management . . . . . 3  
 FREC 427 Agribusiness Financial Management . . . . . 3  
 FREC 471 Futures and Options Markets . . . . . 4  
 Two Business Administration Courses at the 400-level in marketing related areas.  
 These are in addition to BUAD 301-Introduction to Marketing and two additional  
 Business and Economics courses at the 300 and 400 level required by the Food  
 and Agribusiness Management major. . . . . 6

**CREDITS TO TOTAL A MINIMUM OF . . . . . 128**


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**MINOR IN FOOD AND AGRIBUSINESS MANAGEMENT**

 The minor in Food and Agribusiness Management requires 18 credits with the  
 FREC prefix, including FREC 150 - Economics of Agriculture and Natural  
 Resources. Students must take five of the nine FREC courses listed below with a  
 minimum of two courses in each area:

## Marketing/Management Area:

 FREC 305 Management and Leadership Development  
 FREC 316 Economics of Biotechnology and New Technologies  
 FREC 345 Strategic Selling and Buyer Communication  
 FREC 404 Food and Fiber Marketing  
 FREC 471 Futures and Options Markets

## Decision Analysis/International Trade Area:

 FREC 408 Research Methods I  
 FREC 409 Research Methods II  
 FREC 410 International Agricultural Trade and Marketing  
 FREC 427 Agribusiness Financial Management

A minimum grade of C- is required in all courses counting toward the minor.

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**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: RESOURCE ECONOMICS**


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**CURRICULUM** CREDITS
**UNIVERSITY REQUIREMENTS**

 ENGL 110 Critical Reading and Writing  
 (with a minimum grade of C-) . . . . . 3

First Year Experience (see page 68) . . . . . 0-4

Discovery Learning Experience (see page 68) . . . . . 3

 Three credits in an approved course or courses stressing multi-cultural, ethnic,  
 and/or gender-related course content (see pages 68-70) . . . . . 3

**MAJOR REQUIREMENTS**

**Agricultural and Biological Sciences** . . . . . 9  
Minimum of one course in three of the following areas: Food Science, Engineering Technology, Animal Science, Entomology and Wildlife Ecology, Plant and Soil Sciences, Statistics, Agriculture, or Biology.

**Social Sciences and Humanities** . . . . . 6  
Minimum of one course in two of the following areas: Anthropology, Black American Studies, Criminal Justice, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

**Physical Sciences** . . . . . 8  
Minimum of eight credits of lab science selected from Chemistry, Physics, Geology, or Physical Science.

**Professional Studies**

MATH 115 Pre-Calculus  
(MATH 221 or higher is strongly recommended) . . . . . 3  
COMM 212 Oral Communication in Business . . . . . 3  
ENGL 312 Written Communications in Business . . . . . 3

One foreign language course . . . . . 3-4  
ECON 151 Introduction to Microeconomics: Prices and Markets . . . . . 3  
ECON 152 Introduction to Macroeconomics: National Economy . . . . . 3  
ECON 300 Intermediate Microeconomic Theory . . . . . 3  
ECON 302 Banking and Monetary Policy . . . . . 3  
ECON 303 Intermediate Macroeconomic Theory . . . . . 3

Two additional courses offered by the College of Business and Economics at the 300-level or higher . . . . . 6  
*Students interested in an Economics minor should see the College of Business and Economics section in this catalog.*

FREC 135 Introduction to Data Analysis . . . . . 3  
FREC 150 Economics of Agriculture and Natural Resources . . . . . 3  
FREC 201 Records and Accounts . . . . . 3  
FREC 240 Quantitative Methods in Agricultural Economics . . . . . 3

Seven courses at the 400-level or above with at least two in each of the following three areas: . . . . . 21-22

**1. Theory**

FREC 404 Food and Fiber Marketing  
FREC 410 International Agricultural Trade and Marketing  
FREC 424 Resource Economics  
FREC 444 Economics and Environmental Management  
FREC 471 Futures and Options Markets

**2. Methods**

FREC 408 Research Methods I  
FREC 409 Research Methods II  
FREC 427 Agribusiness Financial Management  
FREC 480 Geographic Information Systems in Natural Resource Management

**3. Policy**

FREC 406 Agriculture and Natural Resource Policy  
FREC 420 Agriculture in Economic Development  
FREC 429 Community Economic Development  
FREC 450 Topics in Environmental Law

A maximum of three credits of Independent Study in Food and Resource Economics and a maximum of six credits of Independent Study in all areas may be counted toward the degree.

**ELECTIVES**

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only four credits of HESC 120 activity or four credits of performing Music credit may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**HONORS BACHELOR OF SCIENCE:  
RESOURCE ECONOMICS**

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Resource Economics.
2. All the University requirements for the Honors degree (see page 52).  
Courses at the 600-level that satisfy requirements for the major will be considered to be honors courses for the degree.

**DEGREE: BACHELOR OF SCIENCE  
MAJOR: RESOURCE ECONOMICS  
CONCENTRATION: ENVIRONMENTAL ECONOMICS**

The requirements for the major in Resource Economics must be met.

In addition, five of the following FREC courses must be taken: . . . . . 15-16

FREC 406 Agriculture and Natural Resource Policy  
FREC 424 Resource Economics–Theory and Policy  
FREC 429 Community Economic Development  
FREC 444 Economics of Environmental Management  
FREC 450 Environmental Law and Policy  
FREC 480 Geographic Information Systems in Natural Resource Management  
FREC courses required for the Resource Economics major may be used to satisfy requirements for the Environmental Economics concentration.  
Two additional courses from the College of Business and Economics as required for the Resource Economics major, plus an additional course (three courses total) must be taken from the following courses. . . . . 9  
ECON 306 Economic Theory of Politics  
ECON 408 Economics of Law  
ECON 415 Economic Forecasting  
ECON 422 Econometric Methods and Models I  
ECON 423 Econometric Methods and Models II  
ECON 426 Mathematical Economic Analysis  
ECON 433 Economics of the Public Sector  
ECON 475 Economics of Natural Resources  
ECON 477 Benefit-Cost Analysis

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**DEGREE: BACHELOR OF SCIENCE  
MAJOR: RESOURCE ECONOMICS  
CONCENTRATION: SUSTAINABLE DEVELOPMENT**

The requirements for the major in Resource Economics must be met.

In addition, the following six courses must be taken: . . . . . 18

FREC 100 Sustainable Development  
FREC 410 International Agricultural Trade and Marketing  
FREC 424 Resource Economics  
FREC 429 Community Economic Development  
FREC 444 Economics of Environmental Management  
ENWC 201 Wildlife Conservation and Ecology

In addition, one of the following courses must be taken. . . . . 3

ANTH 330 Development and Underdevelopment  
ECON 311 Economics of Developing Countries  
GEOG 422 Resources, Development, and the Environment  
POSC 311 Politics of Developing Nations  
SOCI 460 Women in International Development

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**MINOR IN RESOURCE ECONOMICS**

The minor in Resource Economics requires 18 credits. Students must take FREC 150 and five of the FREC courses listed below, with a minimum of one course in each area:

**1. Theory**

FREC 404 Food and Fiber Marketing  
FREC 410 International Agricultural Trade and Marketing  
FREC 424 Resource Economics  
FREC 444 Economics and Environmental Management  
FREC 471 Futures and Options Markets

**2. Methods**

FREC 408 Research Methods I  
FREC 409 Research Methods II  
FREC 427 Agribusiness Financial Management  
FREC 480 Geographic Information Systems in Natural Resource Management

**3. Policy**

FREC 406 Agriculture and Natural Resource Policy  
FREC 420 Agriculture in Economic Development  
FREC 429 Community Economic Development  
FREC 450 Topics in Environmental Law

A minimum grade of C- is required in all courses counting toward the minor.

**STATISTICS**

Telephone: (302) 831-2511  
E-mail: [ilvento@udel.edu](mailto:ilvento@udel.edu)  
<http://ag.udel.edu>

Statistics is the science of data - the collection, management, analysis and interpretation of data. Statistical methodology is used in virtually every professional field as a way to conduct research and make important decisions. These include the pure sciences such as biology, chemistry and physics, as well as engineering, business, and the social sciences (economics, political science, psychology, and sociology). The Statistics major is based on a combination of a core set of theoretical and methods courses in statistics, as well as opportunities for taking courses in fields of application. The core course work is designed to prepare students for advanced study in statistics by emphasizing a foundation in probability and mathematical statistics, as well as courses in statistical methods such as design and regression. Students also will take courses that build an area of statistical application. The area of application may well be a minor or a second major.

**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: STATISTICS**

**CURRICULUM****CREDITS****UNIVERSITY REQUIREMENTS**

ENGL 110	Critical Reading and Writing (minimum grade C-) . . . . .	3
First Year Experience	(see page 68) . . . . .	0-4
Discovery Learning Experience	(see page 68) . . . . .	3
Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . .		3

**MAJOR REQUIREMENTS**

**Agricultural and Biological Sciences** . . . . . 9  
Minimum of one course in three of the following areas: Engineering Technology,  
Animal Science, Food Science, Entomology and Wildlife Ecology, Plant and Soil  
Sciences, Biology, or Food and Resource Economics.

**Literature and Arts**

Nine credits from English, Art, Art History, Communication, Music, Theatre,  
Foreign Language, or courses cross-listed in these departments. Three credits must  
be in either AGR1212 or COMM212. . . . . 9

**Social Sciences and Humanities**

Minimum of one course in two of the following areas: Anthropology, Black  
American Studies, Criminal Justice, Education, Geography, History, Philosophy,  
Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed  
in these departments. . . . . 6

**Physical Sciences**

Minimum of eight credits of lab science selected from Chemistry, Physics, Geology,  
or Physical Science. . . . . 8

**Professional Studies**

STAT 200 or STAT 408 . . . . .	3
MATH 210 Discrete Mathematics I . . . . .	3
MATH 242 Analytic Geometry and Calculus B . . . . .	4
MATH 243 Analytic Geometry and Calculus C . . . . .	4
MATH 245 An Introduction to Proof . . . . .	3
MATH 349 Elementary Linear Algebra . . . . .	3
MATH 401 Introduction to Real Analysis . . . . .	3
MATH 426 Introduction to Numerical Analysis and Algorithmic Computation . . . . .	3
STAT 370 Introduction to Statistical Analysis I . . . . .	3
STAT 371 Introduction to Statistical Analysis II . . . . .	3
FREC 409 Research Methods II . . . . .	3
STAT 409 Regression and Experimental Design . . . . .	3

Three credits from the following . . . . . 3

Any course satisfying the College of Arts and Sciences Second Writing Course  
requirement. Recommended courses are: ENGL 301- Expository Writing,  
ENGL 312 - Written Communications in Business, ENGL 410 Technical Writing,  
ENGL 415 Writing in the Professions.

One of the following: . . . . . 3

STAT 611	Regression Analysis . . . . .	3
STAT 615	Design and Analysis of Experiments . . . . .	3
FREC 615	Advanced Prices and Statistics . . . . .	3
STAT 674	Applied Data Base Management . . . . .	3

One of the following options (A, B, or C): . . . . . 6-9

**Option A** (for students with previous experience with a programming language)

CISC 181	Introduction to Computer Science and
CISC 220	Data Structures

**Option B** (for students with no previous experience with a programming language)

CISC 105	General Computer Science and
CISC 181	Introduction to Computer Science and
CISC 220	Data Structures

**Option C** (for students with no previous experience with a programming language)

CISC 105	General Computer Science and
CISC 120	Object Oriented Programming in C++ and
CISC 220	Data Structures

Area of application: . . . . . 15

This program requires a fifteen-credit area of application outside Statistics.  
Students must meet regularly with the advisor to develop it.

Students lacking adequate preparation for MATH 242 should begin with MATH  
241. A grade of C- or better is required for all major courses and related work. A  
maximum of three credits of independent study in Food and Resources Economics  
and a maximum of six credits in all areas, including Food and Resource  
Economics, may be counted toward a degree.

**ELECTIVES**

After required courses are completed, sufficient elective credits must be taken to  
meet the minimum credit requirement for the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

**MINOR IN STATISTICS**

A student seeking a minor in statistics must obtain permission from the chairperson  
or his/her designee in the Department of Food and Resource Economics. Course  
requirements include STAT 370, STAT 371, STAT 611 Regression Analysis, and  
FREC 674 cross-listed as STAT 674 Applied Data Base Management. Three  
additional credit hours in statistics are required above STAT 371. Credit toward  
the minor will not be given for STAT 475. A minimum grade of C is required in all  
courses counting toward the minor.

**MINOR IN OPERATIONS RESEARCH**

The Operations Research Minor is designed to provide students with quantitatively  
based decision-making skills as well as exposure to a broad variety of  
applications. A student seeking a minor in Operations Research must obtain  
permission from the chair or his/her designee in the Department of Food and  
Resource Economics. 18 credit hours are required for the minor.

Required courses: (6 hours)

ORES 401	An Introduction to Operations Research
STAT 370	Introduction to Statistical Analysis I

Remaining four courses are to be selected from the following list:

STAT 371	Introduction to Statistical Analysis II
FREC 335	Advanced Data Management
FREC 409	Research Methods II
FREC 674	Applied Data Base Management
MATH 389	Graph Theory
MATH 529	Linear Programming—Applications and Methods
ECON 415	Economic Forecasting

BUAD 306	Operations Management
CIEG 482	Systems Design and Operation
CIEG 486*	Engineering Management
EGTE 401	Introduction to Quality Control
EGTE 402	Quality Control Applications
EGTE 416*	Project Economic Analysis
EGTE 417	Project Management

\*Only 1 of CIEG 486 and EGTE 416 can be counted towards the minor. A minimum grade of C is required in all courses counting toward the minor.

## NATURAL RESOURCE MANAGEMENT

Interested students should contact Dr. Steven Hastings,  
209 Townsend Hall (302-831-1318).  
<http://ag.udel.edu>

Natural Resource Management is an interdepartmental major administered by the Departments of Entomology and Wildlife Ecology, Food and Resource Economics, and Plant and Soil Sciences. The purpose of the major is to teach an understanding of the social, physical, economic, legal, and political problems of managing the use and perpetuation of natural resources together with the skills and capabilities to address those problems in public or private forums. It combines education in the basic and applied biological and physical sciences with the fundamentals of public policy formulation.

The curriculum includes courses to help students understand the natural sciences, mathematics and statistics, economics and public policy; appreciate the world's biodiversity; communicate effectively; use computers to manage information; and solve "real world" problems. Students will also have a broad interdisciplinary education in the arts, humanities, social sciences and environmental ethics.

## DEGREE: BACHELOR OF SCIENCE

### MAJOR: NATURAL RESOURCE MANAGEMENT

CURRICULUM	CREDITS
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#### UNIVERSITY REQUIREMENTS

ENGL 110	Critical Reading and Writing (minimum grade of C-)	3
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First Year Experience (see page 68)	0-4
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Discovery Learning Experience (see page 68)	3
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Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70)	3
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#### MAJOR REQUIREMENTS

<b>Literature and Arts</b>	6
Six credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments.	

<b>Social Sciences and Humanities</b>	6
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Minimum of one course in two of the following areas: Anthropology, Black American Studies, Criminal Justice, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

#### Professional Studies

AGRI 165	Mastering the Freshman Year (or any equivalent Department freshman seminar)	1
BISC 207/208	Introductory Biology I and II	
or		
PLSC 101	Botany I	4-8
CHEM 101/102	General Chemistry I and II	
or		
CHEM 103/104	General Chemistry I and II	8
ECON 151	Introduction to Microeconomics	3
ECON 152	Introduction to Macroeconomics	3
ENWC 201	Wildlife Conservation and Ecology	3
MATH 221/222	Calculus I and II	6
FREC 135	Introduction to Data Analysis	3
FREC 150	Economics of Agriculture and Natural Resources	3
FREC 424	Resource Economics: Theory and Policy	3

FREC 444	Economics of Environmental Management	3
FREC 480	Geographic Information Systems in Natural Resource Management	4
PLSC 201	Botany II	4
PLSC 204	Introduction to Soil Science	3
PLSC 205	Introduction to Soil Science Laboratory	1

#### GROUP I: Communications:

6 credits from the following:	6
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(including a minimum of three credits in oral communication)

Any course satisfying the College of Arts and Sciences second writing course requirement. Recommended courses are: ENGL 301-Expository Writing, ENGL 312-Written Communications in Business, ENGL 410-Technical Writing, ENGL 415-Writing in the Professions.

AGRI 212	Oral Communication in Agriculture and Natural Resources
FREC 345	Strategic Selling and Buyer Communication
UNIV 401/402	Senior Thesis (Any student successfully completing a Senior Thesis may count three credits toward the writing course requirement of this group.)

#### GROUP II: Chemistry/Physics:

8 credits from:	8
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CHEM 213	Elementary Organic Chemistry
CHEM 214	Elementary Biochemistry
CHEM 216	Elementary Biochemistry Laboratory
CHEM 220	Quantitative Analysis
CHEM 221	Quantitative Analysis Laboratory
CHEM 321	Organic Chemistry
CHEM 322	Organic Chemistry
PHYS 201	Introductory Physics I
PHYS 202	Introductory Physics II

#### GROUP III: Statistics:

6 credits from:	6
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FREC 408/409	Research Methods I and II
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or

MATH 201/202	Introduction to Statistics I and II
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#### GROUP IV: Ecosystems:

6 credits from:	6
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BISC 302	General Ecology
ENWC 325	Wildlife Management
ENWC/ PLSC 440	Integrated Disease and Pest Management
or	
ENWC 411	Insect Pest Management
GEOG 235	Conservation of Natural Resources
or	
GEOG 236	Conservation: Global Issues
or	
GEOG 230	Humans and Earth Ecosystem
PLSC 305	Environmental Soil Management

#### GROUP V: Plants and Animals:

6 credits from:	6
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BISC 300	Introduction to Microbiology
ENWC 205	Elements of Entomology
ENWC 215	Entomology Laboratory
ENWC 406	Insect Identification - Taxonomy
ENWC 318	Taxonomy of Birds
ENWC 418	Avian Biology
ENWC 425	Mammalogy
ENWC 426	Aquatic Insects
PLSC 212	Woody Landscape Plants
PLSC 303	Introductory Plant Pathology
PLSC 404	Plant Taxonomy

#### GROUP VI: Land and Water Management:

6 credits from:	6
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EGTE 103	Land and Water Management
EGTE 104	Introduction to Land Surveying
EGTE 328	Waste Management Systems
GEOG 107	General Geology
GEOG 101	Physical Geography: Climatic Processes
GEOG 106	Physical Geography: Land Surface Processes
GEOG 220	Meteorology
GEOG 320	Water and Society

#### GROUP VII: Natural Resource/Environmental Policy:

12 credits from	12
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(including a minimum of six credits from FREC choices):

ECON 306	Public Choice
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ECON 332	Public Finance and Fiscal Policy
ECON 360	Government and Business
EGTE 416	Project Economics Analysis
FREC 406	Agriculture and Natural Resource Policy
FREC 429	Community Economic Development
FREC 450	Environmental Law and Policy
POSC 220	Introduction to Public Policy
POSC 350	Politics and the Environment

#### GROUP VIII: Ethics:

3 credits from:	3
PHIL 200	Business Ethics
PHIL 202	Contemporary Moral Problems
PHIL 203	Ethics
PHIL 340	Cross Cultural Environmental Ethics
PHIL 448	Environmental Ethics

#### ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only four credits of HESC 120 activity or four credits of performing Music credit may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 130**

#### HONORS BACHELOR OF SCIENCE: NATURAL RESOURCE MANAGEMENT

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Natural Resource Management.
2. All of the University's requirements for the Honors Baccalaureate degree (see page 52). Courses at the 600-level that satisfy requirements in the major will be considered to be Honors courses for the degree.

#### PLANT AND SOIL SCIENCES

Telephone: (302) 831-2531  
E-mail: [dfrey@udel.edu](mailto:dfrey@udel.edu)  
<http://ag.udel.edu>  
Faculty Listing: <http://ag.udel.edu/plsc/faculty/facultyStaff.htm>

Plant and Soil Sciences includes disciplines of study that apply chemical, biological, and physical principles toward insuring adequate food supplies in a safe and aesthetic environment. Faculty in the department have teaching and research programs in plant molecular biology, botany, anatomy, physiology, taxonomy, genetics-plant breeding, cell and tissue culture, pathology, ornamental horticulture, landscape design, crop and vegetable science, soil chemistry, soil management, soil physics, and soil microbiology. Undergraduate students often are involved in some aspect of these research programs, which strengthens and broadens their understanding of science.

Students can major in Plant Science, Landscape Horticulture, or Environmental Soil Science. Minors are offered in Environmental Soil Science and Landscape Horticulture. The department also co-offers the interdisciplinary majors Natural Resource Management and Plant Protection.

#### DEGREE: BACHELOR OF SCIENCE MAJOR: ENVIRONMENTAL SOIL SCIENCE

##### CURRICULUM

##### CREDITS

#### UNIVERSITY REQUIREMENTS

ENGL 110	Critical Reading and Writing (minimum grade of C-) . . . . .	3
First Year Experience (see page 68) . . . . .		0-4
Discovery Learning Experience (see page 68) . . . . .		3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) . . . . . 3

#### MAJOR REQUIREMENTS

**Agricultural and Biological Sciences** . . . . . 6-8  
Two courses in any of the following areas: Animal Science, Food Science, Food and Resource Economics (except FREC 135), Entomology and Wildlife Ecology, Agricultural Education, Agriculture, Statistics, or Biology.

**Literature and Arts** . . . . . 3

Three credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments.

**Social Sciences and Humanities** . . . . . 6

Minimum of one course in two of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies or courses cross-listed in these departments.

#### Professional Studies

CHEM 101/102	General Chemistry I and II or	
CHEM 103/104	General Chemistry I and II . . . . .	8
CHEM 213	Organic Chemistry . . . . .	4
CHEM 220/221	Quantitative Analysis with Lab . . . . .	4
ENGL 410	Technical Writing . . . . .	3
GEOG 220	Meteorology . . . . .	3
GEOL 107	General Geology I . . . . .	4
MATH 221	Calculus I . . . . .	3
PHYS 201	Introductory Physics I . . . . .	4
PLSC 101	Botany I . . . . .	4
PLSC 151	Introduction to Crop Science . . . . .	3
PLSC 204	Introduction to Soil Science . . . . .	3
PLSC 205	Introduction to Soil Science Lab . . . . .	1
PLSC 305	Soil Fertility and Plant Nutrition . . . . .	4
PLSC 319	Environmental Soil Microbiology . . . . .	4
PLSC 401	Agronomic Crop Science . . . . .	3
PLSC 438	Fate and Transport of Contaminants in Soil . . . . .	3
PLSC 608	Soil Chemistry . . . . .	3

One of the following two courses: . . . . . 3-4

FREC 480	Geographic Information Systems in Natural Resource Management or	
GEOG 372	Geographic Information Systems	

Three of the following courses: . . . . . 8-9

EGTE 103	Land and Water Management
BREG 113	Introduction to Land Surveying
EGTE 328	Agricultural Waste Management
FREC 150	Economics of Agriculture and Natural Resources

#### ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. May include the following suggested courses or other electives.

BISC 321	Environmental Biology
FREC 444	Economics of Environmental Management
GEOG 235	Conservation of Natural Resources
GEOL 415	General Geomorphology
GEOL 421	Environmental and Applied Geology
GEOL 428	Hydrogeology
PLSC 303	Introductory Plant Pathology
PLSC 603	Soil Physics
PLSC 607	Plant and Soil Water Relations
PLSC 619	Soil Microbiology
POSC 350	Politics and the Environment

Only two credits of HESC 120 activity or performing Music credit may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

#### HONORS BACHELOR OF SCIENCE: ENVIRONMENTAL SOIL SCIENCE

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Environmental Soil Science.
2. All of the University's requirements for the Honors Baccalaureate degree (see page 52). Courses at the 600-level that satisfy requirements in the major will be considered to be Honors courses for the degree.



**MINOR IN ENVIRONMENTAL SOIL SCIENCE**

The minor in Environmental Soil Science is open to students in any major and requires a total of 17-18 credits, as follows:

PLSC 204	Introduction to Soil Science	3
PLSC 205	Introduction to Soil Science Lab	1
PLSC 305	Soil Fertility and Plant Nutrition	4

Three of the following five courses: 9-10

PLSC 151	Introduction to Crop Science
PLSC 319	Environmental Soil Microbiology
PLSC 401	Agronomic Crop Science
PLSC 603	Soil Physics
PLSC 608	Environmental Soil Chemistry

**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: LANDSCAPE HORTICULTURE**

**CURRICULUM****CREDITS****UNIVERSITY REQUIREMENTS**

ENGL 110	Critical Reading and Writing (minimum grade of C-)	3
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First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68) 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) 3

**MAJOR REQUIREMENTS****Mathematics**

Mathematics course 3

**Literature and Arts**

Three credits from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments. 3

**Social Sciences and Humanities**

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies or courses cross-listed in these departments. 9

**Professional Studies**

CHEM 101/102	General Chemistry I and II	8
or		
CHEM 103/104	General Chemistry I and II	8
CHEM 213	Organic Chemistry	4
EGTE 103	Land and Water Management	3
ENWC 205	Elements of Entomology	3
FREC 150	Economics of Agriculture and Natural Resources	3
PLSC 101	Botany I	4
PLSC 133	Ornamental Horticulture	3
PLSC 201	Botany II	4
PLSC 204	Introduction to Soil Science	3
PLSC 205	Introduction to Soil Science Lab	1
PLSC 211	Herbaceous Landscape Plants	3
PLSC 212	Woody Landscape Plants	4
PLSC 300	Principles of Animal and Plant Genetics	3
PLSC 303	Introductory Plant Pathology	4
PLSC 305	Soil Fertility and Plant Nutrition	4
PLSC 313	Turf Establishment and Maintenance	4
PLSC 332	Basic Landscape Design	4
PLSC 364	Ornamental Horticulture Internship	3
or		
PLSC 366	Independent Study	3
PLSC 410	Introduction to Plant Physiology	3
PLSC 455	Issues in Plant and Soil Sciences	3

One of the following Communication courses: 3

AGRI 212	Oral Communication in Agriculture and Natural Resources
COMM 212	Oral Communication in Business
COMM 350	Public Speaking
ENGL 312	Written Communication in Business
ENGL 410	Technical Writing

One of the following business-related courses: 3

ACCT 207	Accounting
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ACCT 352	Law and Social Issues in Business
CNST 200	Consumer Economics
CNST 242	Consumer Movement in Perspective
ECON 151	Introduction to Microeconomics
ECON 152	Introduction to Macroeconomics
FREC 201	Records and Accounts
FREC 212	Food Retailing and Product Management
FREC 302	Management of Agribusiness Firms
FREC 404	Food and Fiber Marketing
FREC 406	Agricultural and Natural Resource Policy
FREC 430	Establishing and Managing a Food and Agribusiness Enterprise
PHIL 200	Business Ethics
PLSC 403	Nursery and Garden Center Management
POSC 220	Introduction to Public Policy
POSC 301	State and Local Government

**ELECTIVES**

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only two credits of HESC 120 activity or performing Music credit may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF 124**

**HONORS BACHELOR OF SCIENCE:**  
**LANDSCAPE HORTICULTURE**

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Landscape Horticulture.
2. All of the University's requirements for the Honors Baccalaureate degree (see page 52). Courses at the 600-level that satisfy requirements in the major will be considered to be Honors courses for the degree.

**MINOR IN LANDSCAPE HORTICULTURE**

The minor in Landscape Horticulture is open to students in any major and requires a total of 17-18 credits, as follows:

PLSC 101	Botany I	4
PLSC 133	Ornamental Horticulture	3
PLSC 211	Herbaceous Landscape Plants	3
PLSC 212	Woody Landscape Plants	4

One of the following five courses: 3-4

PLSC 204	Introduction to Soil Science
PLSC 313	Turf Establishment and Maintenance
PLSC 331	Landscape Construction
PLSC 332	Landscape Design
PLSC 422	Plant Propagation

**DEGREE: BACHELOR OF SCIENCE**  
**MAJOR: PLANT SCIENCE**

**CURRICULUM****CREDITS****UNIVERSITY REQUIREMENTS**

ENGL 110	Critical Reading and Writing (minimum grade of C-)	3
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First Year Experience (see page 68) 0-4

Discovery Learning Experience (see page 68) 3

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pages 68-70) 3

**MAJOR REQUIREMENTS****Mathematics**

Mathematics course 3

**Agricultural and Biological Sciences**

Minimum of one course in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Animal Science, Food Science, Entomology and Wildlife Ecology, Agriculture, Agricultural Education, Statistics, or Biology. 9-12

**Literature and Arts**

Six credits from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments. 6

**Social Sciences and Humanities**

Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, 9

Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments.

### Professional Studies

CHEM 101/102	General Chemistry I and II	
or		
CHEM 103/104	General Chemistry I and II	8
CHEM 213	Elementary Organic Chemistry	4

One of the following: . . . . . 3-4

PHYS 201	Introduction to Physics	
GEOL 107	General Geology	
CHEM 214	Elementary Biochemistry	
GEOG 255	Applied Climatology	
PLSC 101	Botany I	4
PLSC 201	Botany II	4
PLSC 204	Introduction to Soil Science	3
PLSC 205	Introduction to Soil Science Lab	1
PLSC 300	Principles of Animal and Plant Genetics	3
PLSC 303	Introductory Plant Pathology	4
PLSC 305	Soil Fertility and Plant Nutrition	4
PLSC 410	Introduction to Plant Physiology	3

### ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only two credits of HESC 120 activity or two credits of performing Music credit may be counted toward the degree.

**CREDITS TO TOTAL A MINIMUM OF . . . . . 124**

## HONORS BACHELOR OF SCIENCE: PLANT SCIENCE

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Plant Science.
2. All of the University's requirements for the Honors Baccalaureate degree (see page 52). Courses at the 600-level that satisfy requirements in the major will be considered to be Honors courses for the degree.

## THE ASSOCIATE IN SCIENCE DEGREE

The College of Agriculture and Natural Resources offers a two-year Associate in Science (AS) degree in Newark. This degree is ideal for students interested in agriculture who desire to spend only two years working toward a degree or who are unsure of their plans for higher education. Admission requirements for the associate degree are the same as for the baccalaureate degree.

The Associate in Science offers an extremely flexible curriculum. The student must complete a minimum of 62 credit hours, with at least 30 of the credits earned within at least four of the five departments in the college. A minimum of 32 credits for the degree must be earned at the University of Delaware. In addition, the recipient must have a minimum GPA of 2.0. A candidate must apply for the associate degree during the academic term in which all requirements for the degree are to be completed and must, at the time of application, be enrolled in the college.

Although not recommended, a student could take all 62 credits in agricultural courses. A better approach would be for the student to take some course work in the areas of physical science, social science, English, and mathematics, along with his or her courses in agriculture. This approach would allow the student to more easily complete a BS degree program at a later date.