In the College of Agriculture and Natural Resources, business, science and technology are utilized 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 in the College of Agriculture and Natural Resources provide the undergraduate student: (1) knowledge pertaining to a specific agricultural science, (2) fundamental training in other basic sciences, and (3) a broad, general educational experience. The curricula provide a flexible program of study designed to keep the student up to date on the rapid changes and improvements in agriculture. Frequent consultation with a faculty advisor helps the student make steady progress toward achieving these educational goals.

Undergraduate majors are offered in resource economics, agricultural and technology education, animal science, bioresources engineering technology, engineering technology, entomology, environmental soil science, food and agribusiness management, food science and technology, general agriculture, landscape horticulture, natural resource management, plant biology, plant protection, plant science, statistics, and wildlife conservation. Concentrations are available in agricultural and natural resources education, animal science, biotechnology, applied animal science, environmental economics, food marketing, food science, food technology, general animal science, preveterinary medicine, and technology education. Students interested in engineering technology or general agriculture may complete their degree requirements on the Newark campus or at Dover or Georgetown.

College faculty foster undergraduate student involvement in the University Honors Program through sponsorship of Science and Engineering Scholars and candidates for the Degree with Distinction. The teaching philosophy of the faculty is to emphasize basic knowledge pertaining to agriculture and natural resources.

**DEAN’S SCHOLAR PROGRAM**

The Dean’s Scholar Program exists to serve the needs of 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 work. In consultation with faculty advisors and the Associate or 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 Arts and Science and in Agriculture and Natural Resources may qualify for Honors Degrees. Contact the Assistant/Associate Dean in the college or go to http://www.udel.edu/provost/acadprog.html for more information and the application.
PREVETERINARY INSTRUCTION

Students in the College of Agriculture and Natural Resources 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 department listing.

AGRICULTURAL AND TECHNOLOGY EDUCATION

This program offers a Bachelor of Science degree that qualifies the individual for teacher certification in two concentration areas, agricultural and natural resources education and technology education.

The Agricultural and Natural Resources Education concentration 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, agricultural economics, agribusiness, natural resource management, and biotechnology. Students develop and practice their leadership skills through participation in FFA activities and other student organizations.

The Technology Education concentration supplies students with the basic knowledge and skills needed for the next millennium. Students study the resources, systems, and products of technology and their social and cultural impact in three focus areas: communications, physical, and bio-related. Communications covers subjects such as graphics, photography, audio and video, drafting and design, electronic and telecommunications, desktop publishing, and other communications-related topics. The physical area covers topics in construction, manufacturing, transportation, and other engineering-related subject matter. The bio-related area provides opportunities to study subjects related to biotechnology, environment technology, bioengineering, and other bio-related topics.

Both concentrations provide the pedagogical skills that give the student 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 both the classroom and laboratory setting using modern technology and techniques.

The curriculum in this major is arranged individually with the liaison professor in agriculture and technology education.

Telephone: (302) 831-1320
E-mail: jrbacon@udel.edu
http://ag.udel.edu/academicprograms/majors/agricultural_education.htm

DEGREE: BACHELOR OF SCIENCE

MAJOR: AGRICULTURAL AND TECHNOLOGY EDUCATION CONCENTRATION: AGRICULTURAL AND NATURAL RESOURCES EDUCATION

Students must complete all the requirements for the core curriculum in Agricultural and Technology Education, in addition to the concentration requirements below.

Mathematics

Mathematics Course

Physical Sciences

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

Technical Agriculture & Natural Resources Courses

A 2.75 index in at least thirty credits of technical agriculture and natural resource courses from at least three departments in the college. Students are to meet with their Agriculture and Technology Education advisor before selecting these 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 and/or four credits of performing Music credit may be counted toward the degree.

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE

MAJOR: AGRICULTURAL AND TECHNOLOGY EDUCATION CONCENTRATION: TECHNOLOGY EDUCATION

Students must complete all the requirements for the core curriculum in Agricultural and Technology Education, in addition to the concentration requirements below.

Mathematics

Mathematics Course

Physical Sciences

Minimum of eleven credits selected from one of the following course sequences:

CHEM 101/102 or 103/104 and a Physics course
PHYS 201/202 or 207/208 and a Chemistry course

Technology Courses

A 2.75 index in at least thirty credits of technology courses in the three focus areas: communications, physical, and bio-related, with at least six credit hours in each area. The remaining twelve credits are to be selected from one of the focus areas, matching the student's interest. Students are to meet with their Agricultural and Technology Education advisor before selecting these 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 and/or four credits of performing Music credit may be counted toward the degree.

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

ANIMAL AND FOOD SCIENCES

The Department of Animal and Food Sciences offers undergraduate major 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. Animal health, management, nutrition, molecular biology and physiology constitute areas in which the animal science student may wish to specialize. 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 B.S. degree, but also the admission requirements of the U.S. veterinary schools to which students apply. 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 Sciences major. A minor in Animal Science is also available.

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 must 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. A minor in Food Science is also available.

Telephone: (302) 831-2508
E-mail: udel_anfs@udel.edu
http://ag.udel.edu/departments/anfs/index.html

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
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57) 3

MAJOR REQUIREMENTS
Computer Science course (FREC 135 or equivalent) 3
Agricultural and Biological Sciences
Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Entomology and Applied Ecology, or Plant and Soil Sciences. 6-8

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

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

MAIH 115 or higher 3
BISC 207/208 Introductory Biology I and II 8
CHEM 101/102 General Chemistry I and II 8
An associated laboratory course must be taken with each of the above courses. CHEM 101 requires BISC 109, and CHEM 102 requires BISC 110. One course must be selected from the following:

ANSC 421 Paultry Production 3-4
ANSC 417 Beef Cattle and Sheep Production 3
ANSC 418 Swine Production 3
ANSC 420 Poultry Production 3

No more than five credits of ANSC 266, 366, 466, or 666 Special Problem/Independent Study may be used for the major.

Elective Animal Science courses 5

Recommended Electives
FREC 201 Records and Accounts 3
ANSC 233 Animal Behavior 3
ANSC 332 Introduction to Animal Diseases 3
ANSC 432 Comparative Physiology of Domestic Animals 3
ANSC 441 Reproductive Physiology of Domestic Animals 3

Required Animal Science electives 16

Recommended Animal Science electives 9

Other courses in Animal Science 4

Recommended Animal Science electives 9

Elective Animal Science courses 5

Total 130

CREDITS TO TOTAL A MINIMUM OF.............................................. 130
### DEGREE: BACHELOR OF SCIENCE
### MAJOR: ANIMAL SCIENCE
### CONCENTRATION: ANIMAL BIOTECHNOLOGY

All requirements for the General Animal Science program must be met. The following courses are also required for the concentration:

#### Within the Concentration
- **ANSC 270**: Biotechnology; Science and Socioeconomic Issues 3
- **ANSC 310**: Animal Genetics Laboratory 1
- **ANSC 345**: Comparative Physiology of Domestic Animals 4
- **ANSC 466**: Independent Study (Approved research project) 3
- **ANSC 470**: Molecular Genetics 3
- **BISC 300**: Introduction to Microbiology 4
- **BISC 301**: Molecular Biology of the Cell 4
- **CHEM 321/322**: Organic Chemistry 8
- **CHEM 527**: Introductory Biochemistry

or

- **CHEM 214/216**: Elementary Biochemistry

#### ELECTIVES

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

**Recommended Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ANSC 399</td>
<td>Teaching Assistant</td>
<td>3</td>
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<tr>
<td>ANSC 436</td>
<td>Immunology of Domestic Animals</td>
<td></td>
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<tr>
<td>ANSC 624</td>
<td>Monogastric Nutrition</td>
<td></td>
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<tr>
<td>ANSC 633</td>
<td>Poultry Pathology</td>
<td></td>
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<tr>
<td>ANSC 635</td>
<td>Introductory Virology</td>
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<td>ANSC 643</td>
<td>Molecular Endocrinology</td>
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<td>ANSC 644</td>
<td>Biotechnics</td>
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<td>ANSC 645</td>
<td>Avian Physiology</td>
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<td>ANSC 654</td>
<td>Ruminant Nutrition</td>
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<tr>
<td>BISC 601</td>
<td>Immunocommunity</td>
<td></td>
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<tr>
<td>BISC 602</td>
<td>Molecular Biology of the Cell</td>
<td></td>
</tr>
<tr>
<td>BISC 650</td>
<td>Bacterial Physiology</td>
<td></td>
</tr>
<tr>
<td>BISC 653</td>
<td>Recent Advances in Molecular Biology</td>
<td></td>
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<tr>
<td>BISC 654</td>
<td>Biochemical Genetics</td>
<td></td>
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<tr>
<td>BISC 658</td>
<td>Developmental Genetics</td>
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<tr>
<td>BISC 679</td>
<td>Virology</td>
<td></td>
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<tr>
<td>BISC 693</td>
<td>Human Genetics</td>
<td></td>
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<tr>
<td>CHEM 220</td>
<td>Quantitative Analysis</td>
<td></td>
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<tr>
<td>CHEM 418</td>
<td>Introductory Physical Chemistry</td>
<td></td>
</tr>
<tr>
<td>COM 350</td>
<td>Public Speaking</td>
<td></td>
</tr>
<tr>
<td>ENGL 312</td>
<td>Written Communication in Business</td>
<td></td>
</tr>
<tr>
<td>FREC 408</td>
<td>Research Methods</td>
<td></td>
</tr>
</tbody>
</table>

**Credits to Total a Minimum of**: 130

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### DEGREE: BACHELOR OF SCIENCE
### MAJOR: ANIMAL SCIENCE
### CONCENTRATION: PREVETERINARY MEDICINE

All requirements for the General Animal Science program must be met. The following courses are also required for the concentration:

#### Within the Concentration
- **ANSC 310**: Animal Genetics Laboratory 1
- **ANSC 345**: Comparative Physiology of Domestic Animals 4
- **BISC 300**: Introduction to Microbiology 4
- **CHEM 321/322**: Organic Chemistry 8
- **CHEM 527**: Introductory Biochemistry

or

- **CHEM 214/216**: Elementary Biochemistry

#### ELECTIVES

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

**Recommended Electives**

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<tr>
<th>Course Code</th>
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<tr>
<td>FREC 408</td>
<td>Research Methods</td>
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</tr>
</tbody>
</table>

**Credits to Total a Minimum of**: 130

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### 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 generic requirements for the Honors degree (see page 43). 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, ENTO, or BISC will, if taken as Honors, count toward the 12 Honors credits required in the major or in collateral disciplines.
3. A grade-point index of at least 3.400 in the major.

### REQUIREMENTS FOR A MINOR IN ANIMAL SCIENCE

The minor in animal science requires 18 credits in animal science including the following: ANSC 101; 111; 251; 332; 441; and one course from ANSC 404, 417, 418, 420, and 421.
### UNDERGRADUATE ANIMAL AND FOOD SCIENCES • AGRICULTURE AND NATURAL RESOURCES

#### DEGREE: BACHELOR OF SCIENCE

**MAJOR: FOOD SCIENCE AND TECHNOLOGY**

**CONCENTRATION: FOOD SCIENCE**

<table>
<thead>
<tr>
<th>CURRICULUM</th>
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<tbody>
<tr>
<td>UNIVERSITY REQUIREMENTS</td>
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<tr>
<td>ENGL 110 Critical Reading and Writing (with minimum grade of C)</td>
<td>3</td>
</tr>
<tr>
<td>Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57)</td>
<td>3</td>
</tr>
<tr>
<td>MAJOR REQUIREMENTS</td>
<td></td>
</tr>
<tr>
<td>Agricultural and Biological Sciences</td>
<td>3-4</td>
</tr>
<tr>
<td>One course in any of the following areas: Engineering Technology, Animal Science, Entomology and Applied Ecology, or Plant and Soil Sciences.</td>
<td></td>
</tr>
<tr>
<td>Literature and Arts</td>
<td></td>
</tr>
<tr>
<td>Six credits selected from English, Art, Art History, Communication, Music, Theatre, or Foreign Language, or courses cross-listed in these departments</td>
<td>6</td>
</tr>
<tr>
<td>Social Sciences and Humanities</td>
<td>9</td>
</tr>
<tr>
<td>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, or Women's Studies, or courses cross-listed in these departments</td>
<td></td>
</tr>
<tr>
<td>Professional Studies</td>
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</tr>
<tr>
<td>CHEM 101/102 General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 214 Elementary Biochemistry</td>
<td>8</td>
</tr>
<tr>
<td>or CHEM 527 Introductory Biochemistry</td>
<td>3</td>
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<tr>
<td>PHYS 201/202 Introductory Physics I and II</td>
<td>8</td>
</tr>
<tr>
<td>BISC 207/208 Introductory Biology I and II</td>
<td>8</td>
</tr>
<tr>
<td>BISC 300 Introduction to Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 220 Quantitative Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 221 Quantitative Analysis Laboratory</td>
<td>1</td>
</tr>
<tr>
<td>CHEM 321/322 Organic Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 418 Introductory Physical Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>NTD 200 Nutrition Concepts</td>
<td>3</td>
</tr>
<tr>
<td>MATH 241/242 Analytic Geometry and Calculus A and B</td>
<td>6-8</td>
</tr>
<tr>
<td>FREC 135 Introduction to Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>FREC 408 Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>A minimum grade of C must be achieved for credits to count toward the fulfillment of 36 credits in FOSC; a minimum grade of 2.00 in 200-level courses must be achieved to proceed to upper-level courses; only 300-level courses and a maximum of four credits of Special Problems/Independent Study (FOSC 399) may count toward the fulfillment of this requirement. [FOSC 399, Teaching Assistant, may be taken one time allowing a maximum of 2 credits toward graduation)</td>
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<tr>
<td>FOSC 102 Food for Thought</td>
<td>3</td>
</tr>
<tr>
<td>FOSC 265 Seminar: Food Science</td>
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<tr>
<td>FOSC 305 Food Science</td>
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<td>FOSC 328 Food Chemistry</td>
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<td>FOSC 359 Topics in Food Science</td>
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<tr>
<td>FOSC 409 Food Processing</td>
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<td>FOSC 411 Food Science Capstone</td>
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<tr>
<td>FOSC 439 Food Microbiology</td>
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<tr>
<td>FOSC 445 Food Engineering Technology</td>
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<tr>
<td>FOSC 449 Food Biotechnology</td>
<td>4</td>
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<td>ELECTIVES</td>
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<tr>
<td>After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only two credits of activity-type Physical Education and four credits of Music credits and four credits of 100- and 200-level courses in Military Science/Air Force may be counted toward the degree.</td>
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<td>Recommended Electives</td>
<td></td>
</tr>
<tr>
<td>CHEM 419 Introductory Physical Chemistry</td>
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<td>CHEM 445 Physical Chemistry Laboratory</td>
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<tr>
<td>CREDITS TO TOTAL A MINIMUM OF</td>
<td>128</td>
</tr>
</tbody>
</table>

#### DEGREE: BACHELOR OF SCIENCE

**MAJOR: FOOD SCIENCE AND TECHNOLOGY**

**CONCENTRATION: FOOD TECHNOLOGY**

<table>
<thead>
<tr>
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<td>Agricultural and Biological Sciences</td>
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<tr>
<td>One course from any of the following areas: Bioresearch Engineering, Animal Science, Entomology and Applied Ecology, or Plant and Soil Sciences.</td>
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<td>CHEM 213 Elementary Organic Chemistry</td>
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<tr>
<td>CHEM 214/216 Elementary Biochemistry with Lab</td>
<td>4</td>
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<tr>
<td>CHEM 220 Quantitative Analysis</td>
<td>3</td>
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<td>BISC 207/208 Introductory Biology I and II</td>
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<td>MATH 221/222 Calculus I and II</td>
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<td>FREC 135 Introduction to Data Analysis</td>
<td>3</td>
</tr>
<tr>
<td>FREC 408 Research Methods</td>
<td>3</td>
</tr>
<tr>
<td>A minimum grade of C must be achieved for credits to count toward the fulfillment of 36 credits in FOSC; a minimum grade of 2.00 in 200-level courses must be achieved to proceed to upper-level courses; only 300-level courses and a maximum of four credits of Special Problems/Independent Study (FOSC 399) may count toward the fulfillment of this requirement. [FOSC 399, Teaching Assistant, may be taken one time allowing a maximum of 2 credits toward graduation)</td>
<td></td>
</tr>
<tr>
<td>FOSC 102 Food for Thought</td>
<td>3</td>
</tr>
<tr>
<td>FOSC 265 Seminar: Food Science</td>
<td>1</td>
</tr>
<tr>
<td>FOSC 305 Food Science</td>
<td>3</td>
</tr>
<tr>
<td>FOSC 328 Food Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>FOSC 329 Food Analysis</td>
<td>4</td>
</tr>
<tr>
<td>FOSC 359 Topics in Food Science</td>
<td>1</td>
</tr>
<tr>
<td>FOSC 409 Food Processing</td>
<td>4</td>
</tr>
<tr>
<td>FOSC 411 Food Science Capstone</td>
<td>4</td>
</tr>
<tr>
<td>FOSC 439 Food Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>FOSC 445 Food Engineering Technology</td>
<td>4</td>
</tr>
<tr>
<td>FOSC 449 Food Biotechnology</td>
<td>4</td>
</tr>
<tr>
<td>ELECTIVES</td>
<td></td>
</tr>
<tr>
<td>After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only two credits of activity-type Physical Education and four credits of Music credits and four credits of 100- and 200-level courses in Military Science/Air Force may be counted toward the degree.</td>
<td></td>
</tr>
<tr>
<td>CREDITS TO TOTAL A MINIMUM OF</td>
<td>128</td>
</tr>
</tbody>
</table>

#### 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 generic requirements for the Honors degree (see page 43). 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 related technical area will, if taken as Honors,
count toward the total of Honors credits required in the major or in
collateral disciplines
3 A grade-point index of at least 3.400 in the major at the time of
graduation

REQUIREMENTS FOR A MINOR IN FOOD SCIENCE

The minor in food science requires 15 food science credits and provides
students in other degree programs with an opportunity to
acquaint themselves with food science. Course selection depends on
completion of prerequisites and other science and math preparation.

Student Eligibility Requirements
1 The minor is awarded only to students who have applied and been admitted to
2 The minor in Food Science requires a minimum of 15 food science credits,
   including FOSC 305/306 (3 credits), and any 3 other FOSC courses above
   the 300-level
3 A C grade or 2.00 or higher is required in all FOSC courses for the minor in
   Food Science.
4 Successful completion of MATH 221/222, Calculus I and II [6 credits] math-
   ematics courses is required prior to taking food science courses for the minor

FOSC 305/306 Food Science & Laboratory ................................. 3
Select any 3 courses from:
FOSC 328 Food Chemistry .................................................. 3
FOSC 329 Food Analysis ...................................................... 3
FOSC 409 Food Processing ................................................... 3
FOSC 411 Food Science Cepatone ......................................... 3
FOSC 439 Food Microbiology ................................................ 3
FOSC 445 Food Engineering Technology .................................. 3
FOSC 449 Food Biotechnology .............................................. 3
Prerequisites may be waived. Permission of instructor to register is
based on individual student academic record and major. See a food sci-
ence faculty member for advisement on readiness for specific FOSC
courses and course selection for the minor.

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

BIORESOURCES ENGINEERING

The Bioresources Engineering Department offers undergraduate majors
in Bioresources Engineering Technology and Engineering Technology. Both majors are accredited by the Accreditation Board
for Engineering and Technology (ABET).

Bioresources engineering technology is the application of engi-
neering techniques in such areas as production mechanization, ener-
gy, soil and water conservation, plant and animal environments,
agricultural waste management, processing and storage, and building
construction. This requires a knowledge of physical and natural sci-
ences and technical skills to support engineering activities.

The bioresources engineering technology curriculum is designed
to prepare students for engineering-related employment in agricultur-
al, natural resources, and environmental industries. A scientific or
business background may be obtained according to the student’s
interest through the selection of electives in the College of Agricu-
lture and Natural Resources and other colleges of the University.

The computer is a heavily used tool throughout the bioresources
engineering technology curriculum. Students are urged to purchase a
personal computer. Please contact the department chair for further
information on computer specifications.

Telephone: (302) 831-2468
E-mail: km1@udel.edu

http://ag.udel.edu/departments/bioeng/index.html

DEGREE: BACHELOR OF APPLIED SCIENCE
MAJOR: BIORESOURCES ENGINEERING TECHNOLOGY

CURRICULUM

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing [with minimum grade C] ............. 3
Three credits in an approved course or courses stressing
   multicultural, ethnic, and/or gender-related content (see p. 57)

MAJOR REQUIREMENTS

Communications
Six additional credits to provide training in
   oral and written communications.

EGTE 365 Junior Seminar .................................................. 1

A second writing course selected from:

ENGL 301 Expository Writing .............................................. 3
ENGL 302 Advanced Composition ....................................... 3
ENGL 307 News Writing and Editing .................................... 3
ENGL 312 Written Communications in Business .......................... 3
ENGL 410 Technical Writing .............................................. 3

An oral communications course selected from:

AGRI 212 Oral Communications in Agriculture and Natural Resources ....... 3

COMM 200 Introduction to Human Communication Systems ................. 3
COMM 255 Fundamentals of Communication .................................. 3
COMM 312 Oral Communication in Business .................................. 3
COMM 350 Public Speaking .................................................. 3
COMM 356 Small Group Communication .................................... 3

Social Sciences and Humanities

ECON 131 Introduction to Microeconomics ................................ 3
ECON 152 Introduction to Macroeconomics ................................ 3

Nine additional credits to be selected from a minimum of three of the following areas: Anthropology, Art, Art Histo-
ry, Black American Studies, Criminal Justice, Economics, Education,
English, Foreign Language, Geography, History, Music, Philosophy, Politi-

cal Science, Psychology, Sociology, Theatre, or Women’s Studies, or
courses cross-listed in these departments.

Basic Sciences and Mathematics

CHEM 103/104 General Chemistry I and II ................................ 8
PHYS 207/208 Fundamentals of Physics I and II .............................. 8
MATH 241/242/243 Analytic Geometry and Calculus A, B and C ............ 12
Select one of the following Biology/Life Sciences options I, II, or III ........... 7-8

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

II
BISC 103/113 General Biology ................................................ 8

III
PLSC 101 Botany I .............................................................. 4

ENTO 201 Wildlife Conservation and Ecology ................................ 4

Technical Sciences

EGTE 215 Introduction to Hydraulics ...................................... 4
EGTE 244 Electricity for Engineering Technology ........................... 4
EGTE 311 Fundamentals of Thermodynamics ................................ 3

Three credits selected from one of the following areas: 3

Dynamics, Electronics, Materials Technology, or Strength of Materials

EGTE courses that satisfy this requirement are:

EGTE 344 Electronics and Microprocessors ................................ 4

EGTE 435 Machinery Design and Development ................................ 4

Technical Skills

EGTE 111 Computer Applications in Engineering Technology .............. 3
EGTE 125 Intro. to Bioresources Engineering Tech .......................... 2
EGTE 209 Computer Aided Drafting ........................................ 3
EGTE 223 Surveying .......................................................... 3
EGTE 443 Instrumentation ..................................................... 3

Technical Specialization

EGTE 321 Storm-Water Management ....................................... 4
EGTE 328 Waste Management Systems ...................................... 3
EGTE 421 Bioresources Management Systems ................................ 4
EGTE 431 Mechanical Aspects of Biological and Natural Resources ....... 4
EGTE 451 Senior Design ..................................................... 3
One of the following: .......................................................... 3-4
ENGL 628 Land Application of Wastes
EGTE 331 Mechanical Power Units
EGTE 440 Plant Layout and Materials Handling
EGTE 444 Programmable Logic Control Systems
EGTE 446 Food Engineering Technology
EGTE 456 Fundamentals of HVAC

Technical Support
PLSC 204 Introduction to Soil Science .................................. 4
A minimum of three credits in biology/life sciences .......... 3
or natural resources, excluding courses used to satisfy
the biology, Chemistry, and Physics group.
A minimum of eleven credits in the Bioreosources Engineering .... 11
Department or related courses approved by the student's advisor
To graduate with a major in Bioreosources Engineering Technology, the
student must attain an average 2.0 index in all courses with a BREG or
EGTE prefix.

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

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

ENGINEERING TECHNOLOGY
Engineering technology is part of the broad discipline of engineering,
in which a 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 inde-
pendent judgments and to design and manage systems and compo-
ments to achieve conceptual goals with consideration of their
effectiveness, safety or cost. Close liaison is maintained between the
educational programs and employers to give graduates the greatest
opportunity for career development.

Two concentrations are available within the major: technical
applications and technical management. The technical applications
concentration includes coursework in mechanization, energy man-
agement, hydraulics and hydrology, building environments, waste
management, processing and construction. Students are prepared for
engineering-related employment with industry, consulting firms, con-
struction companies, and government agencies. The technical man-
agement concentration provides basic management concepts utilized in
engineering and production-related activities. This concentration is
often useful to the part-time student who already has an associate
degree in engineering technology and desires to prepare for manage-
ment opportunities, and for other individuals who need additional
technical training.

Students who choose the engineering technology major may
take all of the necessary courses at the University of Delaware or
they may transfer previously completed appropriate course work
from other accredited institutions. Students wishing 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 APPLIED SCIENCE
MAJOR: ENGINEERING TECHNOLOGY

CORE CURRICULUM CREDITS
UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (with minimum grade of C) ...... 3

MAJOR REQUIREMENTS
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
ENGL 415 Writing for the Professions

An oral communications course selected from: .......................... 3
COMM 200 Introduction to Human Communication Systems
COMM 235 Fundamentals of Communication
COMMA 312 Oral Communication in Business
COMM 350 Public Speaking
COMM 356 Small Group Communication

Social Sciences and Humanities
ECON 151 Introduction to Microeconomics ................................ 3
ECON 152 Introduction to Macroeconomics ................................ 3
Nine additional credits to be selected from a minimum of
three of the following areas: Anthropology, Art, Art History, Black
American Studies, Criminal Justice, Economics, Education, English,
Foreign Language, Geography, History, Music, Philosophy, Political
Science, Psychology, Sociology, Theatre or Women's Studies, or cours-
es cross-listed in these departments.

Basic Sciences and Mathematics
Biology/Life Science course .................................................. 3
CHEM 103/104 General Chemistry ........................................ 8
PHYS 201/202 Introductory Physics I and II ................................ 3
or
PHYS 207/208 Fundamentals of Physics I and II .......................... 8
MATH 221/222 Calculus I and II ........................................... 6
MATH 241/242 Analytic Geometry and Calculus A and B .............. 6-8
MATH 201 Introduction to Statistics I ..................................... 3
or
MATH 243 Analytic Geometry and Calculus C ............................. 3-4
Elective Mathematics or Statistics course numbered 201 or above .... 3

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 prereq-
tests 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 stu-
dent must complete a minimum of 48 semester hours in course work assigned
to technical science, technical skills and technical specialization categories.

Technical Sciences
EGTE 215 Introduction to Hydraulics ...................................... 4
EGTE 244 Electricity for Engineering Technology ....................... 4
EGTE 311 Fundamentals for Thermodynamics ........................... 3
EGTE 354 Rural/Light Industrial Buildings ................................ 4
Three credits selected from one of the following areas: .................. 3
Dynamics, Electronics, Material Technology or Strength of Materials
In addition to completing the requirements of the core curriculum in Engineer-
ing Technology, students must complete the requirements for a concentration
in Technical Applications or a concentration in Technical Management.

CONCENTRATION: TECHNICAL APPLICATIONS
Students must complete all the requirements for the core
curriculum in Engineering Technology, in addition to the
concentration requirements below.

Technical Skills
EGTE 111 Computer Application in Engineering Technology ........... 3
EGTE 209 Computer Aided Drafting ...................................... 3
Microcomputer course [EGTE 112 Personal Computers and Technology preferred] 3
Instrumentation or microprocessor course .............................. 3

A maximum of thirty semester credits will be permitted in this category. The selec-
tion of courses in the technical skills category must be consistent with the special-
ization. A maximum of six hours of drafting and one course in computerized
drafting can be applied towards degree requirements. Also a maximum of eight
hours of surveying and topographic mapping and a maximum of six hours of
construction, operation, and production techniques can be applied towards
degree requirements. For transfer students, after matriculation in the program,
course work will normally be limited to instumtion and computer use.

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CONCENTRATION: TECHNICAL MANAGEMENT

Students must complete all the requirements for the core curriculum in Engineering Technology, in addition to the concentration requirements below.

Technical Skills

- EGTE 111 Computer Application in Engineering Technology ........................................ 3
- EGTE 209 Computer-Aided Drafting ............................................................................... 3
- Microcomputer course [EGTE 112 Personal Computers and Technology preferred] ........ 3
- Instrumentation or microprocessor course ................................................................... 3
- A maximum of thirty semester credits will be permitted in this category. The selection of courses in the technical skills category must be consistent with specialization. A maximum of six hours of drafting and one course in computer-aided drafting can be applied towards degree requirements. Also a maximum of eight hours of surveying and topographic mapping and a maximum of six hours of construction, operation and production techniques can be applied towards degree requirements. For transfer students, after matriculation in the program, course work will normally be limited to instrumentation and computer use.

Technical Specialization

One of the following (cannot be satisfied by transfer credit): ........................................ 3
- EGTE 321 Storm Water Management
- EGTE 331 Mechanical Power Unit
- EGTE 435 Machinery Design and Development
- EGTE 456 Fundamentals of HVAC

Four of the following: ........................................................................................................ 12-15

- Four credits of activity-type Physical Education and/or four credits of performing Music credit may be counted toward the degree.

ELECTIVES

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

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

ENTOMOLOGY AND APPLIED ECOLOGY

Entomology emphasizes the structure, physiology, behavior, development, ecology, classification, and management of insects. Applied ecology uses practical methods to manage interrelationships of organisms with each other and their nonliving environment. Pest management and wildlife conservation are examples of applied ecology. Wildlife conservation is the effort to perpetuate free-living, breeding populations of non-domestic native species.

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 courses. The curriculum's flexibility accommodates career goals ranging from research to nature education, conservation advocacy and wildlife management. 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 career objective. Course selection should be made in consultation with the academic advisor during the preregistration period of each term.

E-mail: kra@udel.edu
http://ag.udel.edu/departments/ento/index.html

DEGREE: BACHELOR OF SCIENCE
MAJOR: ENTOMOLOGY

CURRICULUM

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (with minimum grade of C) ......................... 3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content [see p. 57] 3

CREDITS

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MAJOR REQUIREMENTS

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

**Agricultural and Biological Sciences** ........................................... 6
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), or Plant and Soil Sciences

**Literature and Arts** ............................................................................ 6
Six credits selected from English, Art, Art History, Communication, Music, Theatre, or 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, or Women’s Studies, or courses cross-listed with these departments

A minimum grade of C is required for all ENTO credits used to satisfy departmental requirements

**Professional Studies**

MATH 115/171 Pre-Calculus or higher level........................................ 3
BISC 207 Introductory Biology I ............................................................ 4
BISC 308 Introductory Biology II ......................................................... 4
BISC 302 General Ecology .................................................................. 3
CHEM 101/102 General Chemistry or CHEM 103/104 General Chemistry ................................................................. 8

ENTO 205 Elements of Entomology ...................................................... 3
ENTO 305 Entomology Laboratory ......................................................... 2
ENTO 406 Insect Identification—Taxonomy ......................................... 3
ENTO 465 Seminar .............................................................................. 1

ENTO 300 Principles of Animal and Plant Genetics ............................. 3
ENTO 405 Insect Structure and Function ............................................. 4
ENTO 408 Field Taxonomy .................................................................... 3

ENTO 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 the following:.......................................................... 9
Any BISC, PLSC, or ENTO course at or above 300-level (except BISC 302 and 321)

PLSC 151 Introduction to Crop Science ................................................ 3
PLSC 201 Botany II ................................................................................ 4
PLSC 204 Introduction to Soil Science .................................................... 4
PLSC 211 Herbaceous Landscape Plants ............................................. 3
PLSC 212 Woody Landscape Plants ..................................................... 4
PLSC 303 Introductory Plant Pathology ................................................ 3
PLSC 402 Plant Taxonomy ................................................................. 3

ELECTIVES

After required courses are completed, 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 activity-type Physical Education and performing Music may be counted toward the degree

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

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**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: PLANT PROTECTION**

**CURRICULUM**

**CREDITS**

**UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing (with a minimum grade of C) .... 3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57)

**MAJOR REQUIREMENTS**

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

**Agricultural and Biological Sciences** ............................................. 6
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 Applied Ecology, and Plant and Soil Sciences

**Literature and Arts** ............................................................................ 6
Six credits selected from English, Art, Art History, Communication, Music, Theatre, or 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, or Women’s Studies, or courses cross-listed with these departments

**Professional Studies**

MATH 115/171 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

ENTO 205 Elements of Entomology ...................................................... 3
ENTO 305 Entomology Laboratory ......................................................... 2
ENTO 406 Insect Identification—Taxonomy ......................................... 3
ENTO 411 Insect Pest Management ..................................................... 3
ENTO 465 Seminar .............................................................................. 1
PLSC 101 Botany I .............................................................................. 4
PLSC 201 Botany II .............................................................................. 4
PLSC 303 Introductory Plant Pathology ................................................ 4
PLSC 411 Diagnostic Plant Pathology ................................................ 3
PLSC 470 Weed Biology and Control ................................................. 4
A plant production course selected from PLSC 213, 213, or 302 ................................................................. 4

Nine additional ENTO and/or PLSC credits, plus 3 credits of related Internship, Independent Study, Research or Field Experience ................................. 12

**ELECTIVES**

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Courses in Agriculture, Biology, and the Physical Sciences are recommended. Only two credits of activity-type Physical Education and 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

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**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: WILDLIFE CONSERVATION**

**CURRICULUM**

**CREDITS**

**UNIVERSITY REQUIREMENTS**

ENGL 110 Critical Reading and Writing (with a minimum grade of C) .... 3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57)

**MAJOR REQUIREMENTS**

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

**Agricultural and Biological Sciences** ............................................. 6
One course in any of the following areas: Food and Resource Eco-
nomics (except FREC 135), Food Science, Bioresources Engineering, or Animal Science (except ANSC 300).

**Literature and Arts**

Three credits (not from Group IV) selected from English, Art, Art History, Communication, Music, Theatre, or Foreign Language, or courses crosslisted with these departments

**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, or Women's Studies, or courses crosslisted with these departments.

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

**Professional Studies**

MATH 115, 171, 221, or 241 .............................................. 3-4
BISC 207/208  Introductory Biology I and II ....................... 8
BISC 302  General Ecology ............................................. 3
CHEM 101/102  General Chemistry ................................. 8
CHEM 103/104  General Chemistry ................................ 8
ENTO 201  Wildlife Conservation and Ecology .................. 3
ENTO 205  Elements of Entomology ................................ 3
ENTO 305  Entomology Laboratory .................................... 2
ENTO 325  Wildlife Management ..................................... 3
ENTO 415  Wildlife Research Techniques .......................... 3
ENTO 465  Seminar ...................................................... 1
ENTO courses  [may include 3 credits maximum of] .............. 6
Independent Study, Research, and Field Experience

Four courses from the following: .................................. 11-12

ENTO 318  Taxonomy of Birds .........................................
ENTO 406  Insect Identification—Taxonomy .....................
ENTO 408  Insect Field Taxonomy ...................................
ENTO 418  Avian Biology ..............................................
ENTO 424  Herpetology ................................................
ENTO 425  Mammalogy .................................................
M AST 629  Topics in Marine Ecology: Ichthyology (all 3 sections required)

**Group I:** 7-8 credits from the following:

[Or higher levels of CHEM and PHYS]; ................................ 7-8

CHEM 213  Elementary Organic Chemistry ........................
CHEM 214  Elementary Biochemistry ................................
CHEM 216  Elementary Biochemistry Laboratory ..................
GEOG 106  Physical Geography: Land Surface Properties ....
GEOL 107  General Geology ...........................................
PHY S 201  Introductory Physics I ....................................
PHY S 202  Introductory Physics II ...................................
PLSC 204  Introduction to Soil Science ............................

**Group II:** 7-8 credits from the following: ........................ 7-8

ANSC 140  Functional Anatomy of Domestic Animals ...........
B ISC 300  Introduction to Microbiology ...........................
B ISC 305  Cell Physiology ...........................................
B ISC 306  General Physiology .......................................
B ISC 312  General Ecology Lab ......................................
B ISC 313  Experimental Cell Biology ..............................
B ISC 316  Experimental Physiology .................................
B ISC 324  Invertebrate Zoology ....................................
B ISC 401  Molecular Biology of the Cell .........................
B ISC 403  Genetic and Evolutionary Biology ...................
B ISC 411  Molecular Biology of the Cell Laboratory .........
B ISC 422  Vertebrate Morphology ...................................
B ISC 480  Vertebrate Natural History ............................
B ISC 495  Evolution ...................................................
B ISC 637  Population Ecology .....................................
ENTO 300  Principles of Animal and Plant Genetics ...........
ENTO 310  Animal and Plant Genetics Laboratory .............
PLSC 300  Plant Molecular Biology ................................
PLSC 301  Principles of Animal and Plant Genetics ..........
PLSC 306  Plant Molecular Biology ................................
PLSC 310  Animal and Plant Genetics Lab ......................
PLSC 344  Forest Ecology (same as ENTO 344) ................
PLSC 402  Plant Taxonomy ...........................................

P LSC 410  Introduction to Plant Physiology ........................
P LSC 420  Plant Physiology Laboratory ...........................

**Group IV:** 6 credits from the following: ........................ 6
AGRI 312  Oral Communication in Business (same as COMM 312)
COMM 235  Fundamentals of Communication ......................
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 ........................................
GEOG 427  Applied Environmental Science .....................
THEA 102  Introduction to Performance ..........................
THEA 204  Introduction to Voice and Speech ....................

**Group V:** 6 credits from the following or higher-levels in addition to college math and computer requirements: ............ 6

EGTE 111  Computer Applications in Engineering Technology 
or
CISC 105  General Computer Science ............................

GEOG 236  Conservation: Global Issues ............................
GEOG 235  Conservation of Natural Resources ...................
POSC 220  Introduction to Public Policy .........................

**Group VI:** 6 credits from the following: ........................ 6

ECON 151  Introduction to Microeconomics: Prices and Markets
or
FREC 150  Economics of Agriculture and Natural Resources

(Van of two previous courses is prerequisite to FREC 424, 444)

FREC 424  Resource Economics
FREC 444  Economics of Environmental Management
FREC 450  Topics in Environmental Law
GEOG 235  Conservation of Natural Resources
GEOG 236  Conservation: Global Issues
PHIL 340  Cross-cultural Environmental Ethics
PHIL 448  Environmental Ethics
POSC 105  The American Political System
POSC 220  Introduction to Public Policy
POSC 350  Politics and the Environment
STAI 200  Basic Statistical Practice

**Electives**

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Number of elective credits depends on number of courses chosen for concentration groups that satisfy college requirements. Only two credits of activity-type Physical Education and 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 generic requirements for the Honors Baccalaureate degree (see page 43 of this catalog). Courses with the ENTO 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.
REQUIREMENTS FOR A MINOR IN ENTOMOLOGY

The minor in entomology requires 18 credits of ENTO courses including ENTO 205, 305, 406, and 408. 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.

REQUIREMENTS FOR A MINOR IN WILDLIFE CONSERVATION

The minor in wildlife conservation requires 18 credits of courses including ENTO 201, 325 and three courses from among ENTO 205, 305, 318, 406, 418, 424, and 425, of which one must be at the 400-level. Remaining credits may be from any of the 300- and 400-level courses listed above or any other 300- or higher level ENTO course with content primarily focused on taxonomy, ecology, or conservation. 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.

FOOD AND RESOURCE ECONOMICS

The study of 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 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 utilization, and agricultural and environmental policies.

Undergraduate major programs are offered in food and agribusiness management, resource economics, and statistics. The curricula vary in the amount of emphasis given to agricultural production, business economics. All the curricula 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 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, and 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.

Telephone: (302) 831-2508
E-mail: kra@udel.edu
http://ag.udel.edu/departments/frec/index.html

DEGREE: BACHELOR OF SCIENCE

MAJOR: FOOD AND AGribUSINESS MANAGEMENT

CURRICULUM

UNIVERSITY REQUIREMENTS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 110</td>
<td>Critical Reading and Writing (minimum grade C-)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Three credits in an approved course or courses stressing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>multicultural, ethnic, and/or gender-related content</td>
<td>3</td>
</tr>
</tbody>
</table>

MAJOR REQUIREMENTS

<table>
<thead>
<tr>
<th>Area</th>
<th>Courses Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural and Biological Sciences</td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Social Sciences and Humanities</td>
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<td></td>
<td></td>
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<tr>
<td>Physical Sciences</td>
<td></td>
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<tr>
<td>Professional Studies</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Electives</td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

CREDITS TO TOTAL A MINIMUM OF 128
REQUIREMENTS FOR A 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 also take five of the eight FREC courses listed below with a minimum of two courses in each area:

Marketing/Management Area:
- FREC 303 Management and Leadership Development
- FREC 345 Strategic Planning 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.

DEGREE: BACHELOR OF SCIENCE
MAJOR: RESOURCE ECONOMICS

CURRICULUM CREDITS

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (with a minimum grade of C) ........................................ 3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57).

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 Applied 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, or Women's Studies, or courses cross-listed in these departments

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

Professional Studies
- MATH 115 Pre-Calculus (MATH 221 or higher is strongly recommended) ........................................ 3
- COMM 312 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 Bank and Monetary Policy ............................................................................................. 3
- ECON 303 Intermediate Macroeconomic Theory ............................................................................ 3
- Two additional courses offered by the College of Business ............................................................ 6
- Two courses at the 300-level or higher in economics as well as the 200-level or higher

Students interested in a minor in Economics should see "The Minor in Economics" in the College of Business and Economics curriculum.

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 general 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

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 six FREC courses must be taken: 15-16
- FREC 303 Management and Leadership Development
- FREC 345 Strategic Planning and Buyer Communication
- FREC 404 Food and Fiber Marketing
- FREC 471 Futures and Options Markets
- FREC 427 Agribusiness Financial Management

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.

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 and/or four credits of performing Music credit may be counted toward the degree.

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

REQUIREMENTS FOR A 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
DEGREE: BACHELOR OF SCIENCE
MAJOR: STATISTICS

COLLEGE REQUIREMENTS
Skill Requirements
Writing: (minimum grade C)
A second writing course involving significant writing experience including
two papers with a combined minimum of 3,000 words to be submitted for
extended faculty critique of both composition and content. This course
must be taken after completion of 60 credit hours. Appropriate writing
courses are normally designated in the semester’s Registration Booklet
(See list of courses approved for second writing requirement, page 53.)

Foreign Language: Completion of the intermediate-level course [107 or 112] in a given lan-
guage. Number of credits needed and initial placement will depend on
number of years of high school study of foreign language. Students with
four or more years of high school work in a single foreign language may
attempt to fulfill the requirement in that language by taking an exemption
examination.
French, Russian or German is recommended

Breadth Requirements (See page 85)
A total of twenty-one credits from Groups A, B and C is required with a minimum of six credits in each group. The six credits
required from each group could be from the same area.
Group A: Understanding and appreciation of the creative arts and humanities.
Group B: The study of culture and institutions over time.
Group C: Empirically based study of human beings and their environment

MAJOR REQUIREMENTS
A grade of C- or better is required for all major courses and related work. Students lacking adequate preparation for MATH 242 should begin with MATH 241

MATH 205 Statistical Methods
MATH 210 Discrete Mathematics I
MATH 242 Analytic Geometry and Calculus B
MATH 243 Analytic Geometry and Calculus C
MATH 245 Concepts of Analysis
MATH 349 Elementary Linear Algebra
MATH 302 Ordinary Differential Equations
MATH 426 Introduction to Numerical Analysis and Algorithmic Computation
MATH 401 Introduction to Real Analysis
STAT 370 Introduction to Statistical Analysis I
STAT 371 Introduction to Statistical Analysis II
STAT 418 Sampling Methods
STAT 420 Data Analysis and Nonparametric Statistics
STAT 611 Regression Analysis
STAT 615 Design and Analysis of Experiments
One of the following:
STAT 616 Design and Analysis of Experiments II
STAT 617 Multivariate Methods
STAT 618 Sampling Techniques
ENGL 312 Written Communications in Business

One of the following options (A, B, or C):

Option A
(CISC 220 Data Structures)

Option B
(CISC 181 Introduction to Computer Science)

Option C
(CISC 105 General Computer Science)

REQUIREMENTS FOR A 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.

REQUIREMENTS FOR A 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 chairperson 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
BUSAD 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.

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### GENERAL AGRICULTURE

For the undergraduate student with broad interests, the major in general agriculture is offered. This program is administered through the Office of the Dean of Agriculture and Natural Resources.

Telephone: (302) 831-2508
E-mail: kra@udel.edu
http://ag.udel.edu/academicprograms/majors/general_agriculture.htm

#### DEGREE: BACHELOR OF SCIENCE

**MAJOR: GENERAL AGRICULTURE**

<table>
<thead>
<tr>
<th>CURRICULUM</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIVERSITY REQUIREMENTS</td>
<td></td>
</tr>
<tr>
<td>ENGL 110 Critical Reading and Writing (Minimum grade C)</td>
<td>3</td>
</tr>
<tr>
<td>Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57)</td>
<td>3</td>
</tr>
<tr>
<td>MAJOR REQUIREMENTS</td>
<td></td>
</tr>
<tr>
<td>Mathematics and Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>Computer Science course (FREC 135 or equivalent)</td>
<td>3</td>
</tr>
<tr>
<td>Agricultural and Biological Sciences</td>
<td>9-12</td>
</tr>
<tr>
<td>Minimum of one course in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Bioresources Engineering, Animal Science, Entomology, and Applied Ecology, Plant and Soil Sciences</td>
<td>9-12</td>
</tr>
<tr>
<td>Social Sciences and Humanities</td>
<td>9</td>
</tr>
<tr>
<td>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, or Women's Studies, or courses cross-listed in these departments</td>
<td>9</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>8</td>
</tr>
<tr>
<td>Minimum of eight credits selected from one of the following twocourse sequences:</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 101/102 or 103/104</td>
<td>8</td>
</tr>
<tr>
<td>PHYS 201/202 or 207/208</td>
<td>8</td>
</tr>
<tr>
<td>SCEN 101/102</td>
<td>8</td>
</tr>
<tr>
<td>Communications</td>
<td></td>
</tr>
<tr>
<td>A minimum of one course in written communications chosen from the following:</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 301 Expository Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 302 Advanced Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 312 Written Communications in Business</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 410 Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>A minimum of one course in oral communications chosen from the following:</td>
<td>3</td>
</tr>
<tr>
<td>AGRI 312 Oral Communication in Business</td>
<td>3</td>
</tr>
<tr>
<td>COMM 200 Introduction to Human Communication Systems</td>
<td>3</td>
</tr>
<tr>
<td>COMM 255 Fundamentals of Communication</td>
<td>3</td>
</tr>
<tr>
<td>COMM 312 Oral Communication in Business</td>
<td>3</td>
</tr>
<tr>
<td>COMM 350 Public Speaking</td>
<td>3</td>
</tr>
<tr>
<td>COMM 356 Small Group Communication</td>
<td>3</td>
</tr>
<tr>
<td>Within the college</td>
<td></td>
</tr>
<tr>
<td>Thirty additional credits from any of the following departments:</td>
<td>30</td>
</tr>
<tr>
<td>Food and Resource Economics, Bioresources Engineering, Agriculture, Animal Science, Entomology, and Applied Ecology, Food Science, or Plant and Soil Sciences. (Fifteen of the 30 credits must be in courses specified by the major in the college.) A maximum of twelve credits of Special Problems/Independent Study credits in all areas may be counted toward the degree, with a maximum of six credits in any one department</td>
<td>30</td>
</tr>
<tr>
<td>ELECTIVES</td>
<td></td>
</tr>
<tr>
<td>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 and/or four credits of performing Music credit may be counted toward the degree.</td>
<td></td>
</tr>
<tr>
<td>CREDITS TO TOTAL A MINIMUM OF</td>
<td>130</td>
</tr>
</tbody>
</table>

### NATURAL RESOURCE MANAGEMENT

Natural Resource Management is an interdepartmental undergraduate major administered by the Departments of Entomology and Applied 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 in the 21st century, together with the skills and capabilities to address those problems in the 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.

Interested students should contact Dr. Steven Hastings, 209 Townsend Hall (302-831-1318).

http://ag.udel.edu/academicprograms/majors/natural_resource_management.htm

#### DEGREE: BACHELOR OF SCIENCE

**MAJOR: NATURAL RESOURCE MANAGEMENT**

<table>
<thead>
<tr>
<th>CURRICULUM</th>
<th>CREDITS</th>
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<tbody>
<tr>
<td>UNIVERSITY REQUIREMENTS</td>
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<tr>
<td>ENGL 110 Critical Reading and Writing (Minimum grade C)</td>
<td>3</td>
</tr>
<tr>
<td>Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57)</td>
<td>3</td>
</tr>
<tr>
<td>MAJOR REQUIREMENTS</td>
<td></td>
</tr>
<tr>
<td>Literature and Arts</td>
<td>6</td>
</tr>
<tr>
<td>Six credits selected from English, Art, Art History, Communication, Music, Theatre, or Foreign Language, or courses cross-listed in these departments</td>
<td>6</td>
</tr>
<tr>
<td>Social Sciences and Humanities</td>
<td>6</td>
</tr>
<tr>
<td>Minimum of one course in two of the following areas: Anthropology, Black American Studies, Criminal Justice, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, or Women's Studies, or courses cross-listed in these departments</td>
<td>6</td>
</tr>
<tr>
<td>Professional Studies</td>
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</tr>
<tr>
<td>AGRI 165 Mastering the Freshman Year (or any equivalent Department freshman seminar)</td>
<td>1</td>
</tr>
<tr>
<td>BISC 207/208 Introductory Biology I and II</td>
<td>1</td>
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<tr>
<td>PLSC 101 Botany I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 101/102 General Chemistry I and II</td>
<td>4</td>
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<tr>
<td>CHEM 103/104 General Chemistry I and II</td>
<td>4</td>
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<tr>
<td>ECON 151 Introduction to Microeconomics</td>
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<td>ECON 152 Introduction to Macroeconomics</td>
<td>3</td>
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<tr>
<td>ENTO 201 Wildlife Conservation and Ecology</td>
<td>3</td>
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<tr>
<td>MATH 221/222 Calculus I and II</td>
<td>6</td>
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<tr>
<td>FREC 135 Introduction to Data Analysis</td>
<td>3</td>
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<tr>
<td>FREC 150 Economics of Agriculture and Natural Resources</td>
<td>3</td>
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<tr>
<td>FREC 424 Resource Economics: Theory and Policy</td>
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<td>FREC 444 Economics of Environmental Management</td>
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<tr>
<td>FREC 480 Geographic Information Systems in Natural Resource Management</td>
<td>4</td>
</tr>
<tr>
<td>PLSC 201 Botany II</td>
<td>4</td>
</tr>
<tr>
<td>PLSC 204 Introduction to Soil Science</td>
<td>4</td>
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<tr>
<td>GROUP I: Communications: 6 credits from the following:</td>
<td>6</td>
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<tr>
<td>Any course satisfying the College of Arts and Science second writing requirement. Recommended courses are: ENGL 301-Expository Writing, ENGL 312-Written Communications in Business, ENGL 415-Writing in the Professions</td>
<td></td>
</tr>
<tr>
<td>AGRI 312 Oral Communication in Business</td>
<td>3</td>
</tr>
<tr>
<td>FREC 345 Strategic Selling and Buyer Communication</td>
<td>3</td>
</tr>
<tr>
<td>UNIV 401/402 Senior Thesis (Any student successfully completing a Senior Thesis may count three credits toward the writing course requirement of this group)</td>
<td>3</td>
</tr>
</tbody>
</table>

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PLANT AND SOIL SCIENCES

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 active 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 are involved in some aspects of these research programs, which strengthen and broaden their understanding of science.

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

Telephone: (302) 831-2508
E-mail: kra@udel.edu
http://ag.udel.edu/departments/plsc/index.html

DEGREE: BACHELOR OF SCIENCE
MAJOR: ENVIRONMENTAL SOIL SCIENCE

CURRICULUM

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (minimum grade C-) ............. 3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57) .... 3

MAJOR REQUIREMENTS

Computer Science

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

Agricultural and Biological Sciences

One course in any of the following areas: Animal Science, Food Science, Entomology and Applied Ecology, or Biology 3-4

Literature and Arts

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

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, or Women's Studies or courses cross-listed in these departments

Professional Studies

CHEM 101/102 General Chemistry I and II ..................................... 8
CHEM 213 Organic Chemistry ......................................................... 4
CHEM 220/221 Quantitative Analysis with Lab .............................. 4
ENGL 410 Technical Writing .......................................................... 3
GEOL 201 Meteorology ................................................................. 3
GEOL 107 General Geology ......................................................... 3
MATH 211 Calculus I ................................................................. 3
PHYS 201 Introductory Physics I .................................................. 4
PHYS 202 Introductory Physics II ................................................ 4
PLSC 101 Botany I ................................................................. 4
PLSC 151 Introduction to Crop Science .................................... 3
PLSC 204 Introduction to Soil Science ..................................... 4
PLSC 305 Environmental Soil Management ................................ 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 four courses: ............................................. 8-9
EGTE 103 Land and Water Management
EGTE 113 Land Surveying
EGTE 328 Agricultural Waste Management
FREC 135 Computer Science

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

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 and/or four credits of performing Music credit may be counted toward the degree.

CREDITS TO TOTAL A MINIMUM OF ................................................. 130
**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
- **GEOG 415**: Geomorphology
- **GEOG 421**: Environmental and Applied Geology
- **GEOG 428**: Hydrogeology
- **PLSC 301**: Introductory Plant Pathology
- **PLSC 303**: Soil Physics
- **PLSC 307**: Plant and Soil Water Relations
- **PLSC 319**: Environmental Soil Microbiology
- **POSC 350**: Politics and the Environment

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

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### REQUIREMENTS FOR A 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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLSC 204 Introduction to Soil Science</td>
<td>4</td>
</tr>
<tr>
<td>PLSC 303 Environmental Soil Management</td>
<td>4</td>
</tr>
<tr>
<td>Three of the following five courses:</td>
<td>9-10</td>
</tr>
<tr>
<td>PLSC 151 Introduction to Crop Science</td>
<td></td>
</tr>
<tr>
<td>PLSC 319 Environmental Soil Microbiology</td>
<td></td>
</tr>
<tr>
<td>PLSC 401 Agronomic Crop Science</td>
<td></td>
</tr>
<tr>
<td>PLSC 603 Soil Physics</td>
<td></td>
</tr>
<tr>
<td>PLSC 608 Environmental Soil Chemistry</td>
<td></td>
</tr>
</tbody>
</table>

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### REQUIREMENTS FOR A 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:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLSC 101 Botany I</td>
<td>4</td>
</tr>
<tr>
<td>PLSC 133 Ornamental Horticulture</td>
<td>3</td>
</tr>
<tr>
<td>PLSC 211 Herbaceous Landscape Plants</td>
<td>3</td>
</tr>
<tr>
<td>PLSC 212 Woody Landscape Plants</td>
<td>4</td>
</tr>
<tr>
<td>One of the following five courses:</td>
<td></td>
</tr>
<tr>
<td>PLSC 204 Introduction to Soil Science</td>
<td></td>
</tr>
<tr>
<td>PLSC 313 Turf Establishment and Maintenance</td>
<td></td>
</tr>
<tr>
<td>PLSC 331 Landscape Construction</td>
<td></td>
</tr>
<tr>
<td>PLSC 332 Landscape Design</td>
<td></td>
</tr>
<tr>
<td>PLSC 422 Plant Propagation</td>
<td></td>
</tr>
</tbody>
</table>

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### UNIVERSITY REQUIREMENTS

- **ENGL 110**: Critical Reading and Writing (minimum grade C) ........................................................................ 3
- Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57).

### MAJOR REQUIREMENTS

- **Mathematics and Computer Science**
  - Mathematics course (FREC 135 or equivalent) ........................................................................ 3
  - Computer Science course (FREC 135 or equivalent) ........................................................................ 3
  - Literature and Arts
    - Three credits selected from English, Art, Art History, Communication, Music, Theatre, or Foreign Language, or courses cross-listed in these departments.

- **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, or Women's Studies or courses cross-listed in these departments.
  - 9 credits

### Professional Studies

- **CHEM 101/102**: General Chemistry I and II ........................................................................ 8
  - **CHEM 213**: Organic Chemistry ........................................................................ 4
  - **EGTE 103**: Land and Water Management ........................................................................ 3
  - **ENTO 205**: Elements of Entomology ........................................................................ 3
  - **FREC 150**: Economics of Agricultural 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 ........................................................................ 4
  - **PLSC 211**: Herbaceous Landscape Plants ........................................................................ 4
  - **PLSC 212**: Woody Landscape Plants ........................................................................ 4
  - **PLSC 300**: Principles of Animal and Plant Genetics .................................................... 3
  - **PLSC 303**: Introductory Plant Pathology ........................................................................ 4
  - **PLSC 305**: Environmental Soil Management ................................................................. 4
  - **PLSC 313**: Turf Establishment and Maintenance ............................................................. 4
  - **PLSC 332**: Basic Landscape Design ........................................................................ 4
  - **PLSC 364**: Ornamental Horticulture Internship ............................................................ 4
  - **PLSC 366**: Independent Study ........................................................................ 3

- **PLSC 410**: Introduction to Plant Physiology ........................................................................ 3
- **PLSC 455**: Issues in Horticulture ........................................................................ 3
- **PLSC 470**: Weed Biology and Control ........................................................................ 3
- One of the following Communication courses: ........................................................................ 3
  - **AGRI 312**: Oral Communication in Business
  - **COMM 312**: 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
  - **ACCT 332**: 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**: Est 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 activity-type Physical Education and performing Music credit may be counted toward the degree.

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

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### UNIVERSITY REQUIREMENTS

- **ENGL 110**: Critical Reading and Writing (minimum grade C) ........................................................................ 3
- Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57).

### MAJOR REQUIREMENTS

- **Mathematics and Computer Science**
  - Mathematics course (FREC 135 or equivalent) ........................................................................ 3
  - Computer Science course (FREC 135 or equivalent) ........................................................................ 3

### Agricultural and Biological Sciences

One course in any of the following areas: Food Science, Engineering Technology, Animal Science, or Entomology and Applied Ecology

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

- **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, or Women's Studies or courses cross-listed in these departments.

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

### CURRICULUM

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 110 Critical Reading and Writing</td>
<td>3</td>
</tr>
<tr>
<td>Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57).</td>
<td>3</td>
</tr>
</tbody>
</table>

### MAJOR REQUIREMENTS

- **Mathematics and Computer Science**
  - Mathematics course (FREC 135 or equivalent) ........................................................................ 3

### Agricultural and Biological Sciences

One course in any of the following areas: Food Science, Engineering Technology, Animal Science, or Entomology and Applied Ecology

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

### 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, or Women's Studies or courses cross-listed in these departments.
MAJOR REQUIREMENTS

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

Agricultural and Biological Sciences 9-12
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 Applied
ecology, or Biology.

Literature and Arts
Six credits selected from English, Art, Art History, Communication,
Music, Theatre, or 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, Geog-
raphy, History, Philosophy, Political Science, Psychology, Sociology, or
Women's Studies, or courses cross-listed in these departments.

A course may be applied toward both the major requirements and a college
requirement, but credits are counted only once toward graduation.

Professional Studies
CHEM 101/102 General Chemistry I and II
CHEM 103/104 General Chemistry I and II
CHEM 213 Elementary Organic Chemistry

Professional Studies
PLSC 101 Botany I ............................................. 4
PLSC 201 Botany II ............................................ 4
PLSC 204 Introduction to Soil Science 4
PLSC 300 Principles of Plant and Animal Genetics 3
PLSC 303 Introductory Plant Pathology 4
PLSC 306 Introduction to Plant Molecular Biology 4
PLSC 410 Introduction to Plant Physiology 3
PLSC 435 Plant Development Biology 3
FREC 408 Research Methods 3
ENTO 465 Seminar 3
PLSC 305 Environmental Soil Management 4
PLSC 410 Introduction to Plant Physiology 3

Professional Studies
PLSC 410 Introduction to Plant Physiology 3
PLSC 303 Introductory Plant Pathology 3
PLSC 300 Principles of Animal and Plant Genetics 3
PLSC 410 Introduction to Plant Physiology 3
PLSC 305 Environmental Soil Management 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
activity-type Physical Education and/or two credits of performing Music
organization credit may be counted toward the degree.

Suggested courses include:
PHYS 203 or higher Introductory Physics
(Recommended for students interested in graduate school)
CHEM 220/221 Quantitative Analysis

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

DEGREE: BACHELOR OF SCIENCE MAJOR: PLANT SCIENCE

CURRICULUM

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (minimum grade C) 3
Three credits in an approved course or courses stressing
multicultural, ethnic, and/or gender-related content (see p. 57) 3

Professional Studies
BISC 207 Introductory Biology I .................................. 4
BISC 300 Introduction to Microbiology 4
CHEM 101/102 General Chemistry I and II 8
CHEM 213 Elementary Organic Chemistry
CHEM 321/322 Organic Chemistry 4-6
One of the following: 3-8
CHEM 214/216 Elementary Biochemistry and Lab
CHEM 527 Biochemistry
CHEM 641/642 Biochemistry
One of the following Communication courses: 3
AGRI 316 Oral Communication in Business
COMM 312 Oral Communication in Business
COMM 350 Public Speaking
ENGL 312 Written Communications In Business
ENGL 410 Technical Writing
PLSC 101 Botany I ............................................. 4
PLSC 201 Botany II ............................................ 4
PLSC 204 Introduction to Soil Science 4
PLSC 300 Principles of Plant and Animal Genetics 3
PLSC 303 Introductory Plant Pathology 4
PLSC 306 Introduction to Plant Molecular Biology 4
PLSC 410 Introduction to Plant Physiology 3
PLSC 435 Plant Development Biology 3
FREC 408 Research Methods 3
ENTO 465 Seminar 3
PLSC 305 Environmental Soil Management 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
activity-type Physical Education and/or two credits of performing Music
organization credit may be counted toward the degree.

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

THE ASSOCIATE IN SCIENCE DEGREE

A two-year Associate in Science (A.S.) degree is offered by the Col-
lege of Agriculture and Natural Resources. 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 curricu-
lum. 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 depart-
ments in the college. A minimum of 32 credits for the degree must be
earned at the University of Delaware. In addition, the recipient must
be in good academic standing (have a minimum grade point average
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 col-
lege. Later application requires the approval of the student's dean.

Although not necessarily 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 cours-
es in agriculture. This approach would allow the student to more eas-
ily complete a B.S. degree program at a later date if desired.
For those students in Kent and Sussex Counties, the first year could be taken in Dover or Georgetown in the University Parallel Program at the Delaware Technical & Community College. This option would require careful planning, since 30 credits of agricultural courses would be needed in the second year at the College of Agriculture and Natural Resources in Newark.