College of Agriculture and Natural Resources

Undergraduate Programs

- Dean's Scholar Program
- Preveterinary Instruction
- Agricultural Education
- Animal and Food Sciences
  - Animal Science
  - Food Science and Technology
- Bioresources Engineering
  - Bioresources Engineering Technology
  - Engineering Technology
- Entomology and Applied Ecology
  - Entomology
  - Plant Protection
  - Wildlife Conservation

- Food and Resource Economics
  - Agricultural Economics
  - Food and Agribusiness Management
  - Statistics
- General Agriculture
- Natural Resource Management
- Plant and Soil Sciences
  - Environmental Soil Science
  - Landscape Horticulture
  - Plant Biology
  - Plant Science
- The Associate in Science Degree

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 agricultural economics, agricultural 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 biotechnology, applied animal science, food marketing, food science, food technology, general animal science, preveterinary medicine, and resource economics. 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

Each year, the College of Agriculture and Natural Resources allows highly motivated undergraduate students who have clearly defined educational goals and good academic records to pursue the Dean's Scholar Program. Students in the program are freed of most college requirements and develop individual programs of study under the supervision of their faculty adviser. The individual program must be put in writing and approved by the appropriate department chair and the associate dean of the college. Additional information is available from the Office of Academic Programs in the College.

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 EDUCATION

This undergraduate program leading to the Bachelor of Science degree qualifies the individual for certification by the State of
The Agricultural Education program requires a total of 30 credits, including:

- AGED 380 Agricultural Education Materials and Approaches I (3)
- Minimum of eight credits selected from one of the following two-course sequences:
  - CHEM 101/102 or 103/104
  - SCM 101/102
- A minimum grade of C- is required in all AGED and EDUC courses.
- A 2.75 index in at least 30 credits of technical agriculture from at least three departments in the college.

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

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, agricultural 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 pre-veterinary training required for admission to veterinary school. The pre-veterinary 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, 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: Food Science or Food Technology. The Food Science 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 Agricultural Education program requires a 2.5 minimum overall GPA and successfully completing the requirements of Praxis I for enrollment in EDUC 400, Student Teaching, a course required for the degree.

DEGREE: BACHELOR OF SCIENCE MAJOR: AGRICULTURAL EDUCATION

CURRICULUM

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

MAJOR REQUIREMENTS

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

Agricultural and Biological Sciences
- Minimum of one course in three of the following areas: Animal & Food Sciences, Bioresources Engineering, Food and Resource Economics (except FREC 135), Entomology and Applied Ecology, Plant and Soil Sciences, or Biological Science 9-12

Literature and Arts
- Nine credits from English and/or Communication, or courses cross-listed in these departments 9

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

Physical Sciences
- Minimum of eight credits from one of the following two-course sequences: CHEM 101/102 or 103/104 3
- PHYS 201/202 or 207/208 3
- GEOI 105/106 3
- SCEN 101/102 3

Professional Studies
- AGED 380 Agricultural Education Materials and Approaches I 3
- AGED 381 Agricultural Education Materials and Approaches II 3
- EDUC 201 Diversity in the Classroom 3
- EDUC 230 Introduction to Exceptional Children 3
- EDUC 304 Educational Psychology: Social Aspects 3
- EDUC 305 Educational Psychology: Cognitive Aspects 3
- EDUC 400 Student Teaching 9
- EDUC 420 Reading in the Content Area 3
- EDUC 430 Classroom Management 1

The Agricultural Education program requires a 2.5 minimum overall GPA and successfully completing the requirements of Praxis I for enrollment in EDUC 400, Student Teaching, a course required for the degree.

The teacher education program adviser (see list on p. 182) should be consulted for other policies concerning qualifications for student teaching.

Contact Information:
- Telephone: (302) 831-2501
- E-mail: kra@udel.edu
- http://ag.udel.edu/academicprograms/majors/agricultural_education.htm
DEGREE: BACHELOR OF SCIENCE
MAJOR: ANIMAL SCIENCE
CONCENTRATION: GENERAL ANIMAL SCIENCE

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

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 Resources Economics (except FREC 135), Food Science, Bioresource Engineering, Entomology and Applied Ecology, or Plant and Soil Sciences.

Literature and Arts
Six credits selected from English, 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.

MATH 115 or higher 3
or
CHEM 101/102 General Chemistry I and II 3
or
CHEM 103/104 General Chemistry I and II 3

ANSC 101 Introduction to Animal Science 3
ANSC 111 Animal Science Laboratory 1
ANSC 140 Functional Anatomy 4
ANSC 251 Livestock Nutrition and Feeding 3
ANSC 300 Principles of Animal and Plant Genetics 3
ANSC 332 Introduction to Animal Diseases 3
ANSC 345 Comparative Physiology of Domestic Animals 4
ANSC 465 Seminar 1

Elective Animal Science courses 5
One course must be selected from the following: 3-4
ANSC 404 Dairy Production
ANSC 417 Beef Cattle and Sheep Production
ANSC 418 Swine Production
ANSC 421 Poultry Production

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

Credit toward the major will be granted for only two of the following: ANSC 221, 322, 342, or 420 [ANSC 399 may be taken one time for a maximum of 2 credits toward graduation]

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

Recommended Electives
FREC 201/202 Introductory Biology I and II 3
BISC 371 Introduction to Microbiology 3
CHEM 321/322 Organic Chemistry 3
CHEM 527 Introductory Biochemistry 3

CREDITS TO TOTAL A MINIMUM OF 130

DEGREE: BACHELOR OF SCIENCE
MAJOR: ANIMAL SCIENCE
CONCENTRATION: APPLIED ANIMAL SCIENCE

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 417 Beef Cattle and Sheep Production
ANSC 418 Swine Production
ANSC 421 Poultry Production

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

Recommended Electives
ANSC 417/418/421/427 Biotechnology: Science and Socioeconomic Issues 3
ANSC 420 Equine Management
ANSC 431 Infection and Immunity in Animal Diseases
BISC 371/372/373 Introduction to Microbiology 3
COMM 350 Public Speaking 3
ENGL 312 Written Communication in Business 3
FOSC 439/639 Food Microbiology 3
FOSC 449/649 Fermentation Technology 3

CREDITS TO TOTAL A MINIMUM OF 130
### 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
- BISC 371 Introduction to Microbiology
- CHEM 321/322 Organic Chemistry
- CHEM 527 Introductory Biochemistry
- PHYS 201/202 Introductory Physics I and II

**ELECTIVES**

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

**Recommended Electives**
- FREC 201 Records and Accounts
- ANSC 270 Biotechnology: Science and Socioeconomic Issues
- ANSC 399 Teaching Assistant
- ANSC 431 Infection and Immunity in Animal Diseases
- ANSC 635 Introduction to Virology
- COMM 312 Oral Communication in Business
- ENGL 312 Written Communications in Business
- FREC 408 Research Methods

**HONORS BACHELOR OF SCIENCE IN AGRICULTURE: ANIMAL SCIENCE**

The recipient of this degree must complete:
1. All requirements for the Bachelor of Science in Agriculture: 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 16-18 credits in animal science including the following: ANSC 101; 111; 251; 332; one course from ANSC 201, 431, or 441; and one course from ANSC 404, 417, 418, 420, and 421.

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### DEGREE: BACHELOR OF SCIENCE

#### MAJOR: FOOD SCIENCE AND TECHNOLOGY

**CONCENTRATION: FOOD SCIENCE**

**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).

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

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### MAJOR REQUIREMENTS

**Agricultural and Biological Sciences** ........................................ 3-4

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

**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**

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

**Professional Studies**

CHEM 101/102 General Chemistry or
- CHEM 103/104 General Chemistry ........................................ 8
- CHEM 214 Elementary Biochemistry or
- CHEM 509 General Chemistry ........................................ 3
- PHYS 201/202 Introductory Physics I and II ........................................ 8
- BISC 207/208 Introductory Biology I and II ........................................ 8
- BISC 371 Introduction to Microbiology ........................................ 4
- CHEM 260/262 Analytical Chemistry ........................................ 1
- CHEM 321/322 Organic Chemistry ........................................ 8
- CHEM 418 Introductory Physical Chemistry ........................................ 3
- NTDT 200 Nutrition Concepts ........................................ 3
- MATH 221/222 Calculus I and II or
- MATH 241/242 Calculus I and II ........................................ 6-8
- FREC 135 Introduction to Data Analysis ........................................ 3
- FREC 408 Research Methods ........................................ 3

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 x66) 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.]

**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 four credits of Music credits and four credits of major or minor (any concentration) or courses cross-listed in these departments.

**Recommended Electives**
- FOSC 165 Seminar: Food Science ........................................ 1
- FOSC 265 Seminar: Food Science ........................................ 1
- FOSC 328 Food Chemistry ........................................ 4
- FOSC 329 Food Analysis ........................................ 4
- FOSC 359 Topics in Food Science ........................................ 1
- FOSC 365 Seminar: Food Science ........................................ 1
- FOSC 409 Food Processing ........................................ 4
- FOSC 411 Food Science Capstone ........................................ 4
- FOSC 439 Food Microbiology ........................................ 4
- FOSC 445 Food Engineering Technology ........................................ 4
- FOSC 449 Food Biotechnology ........................................ 4

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

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### DEGREE: BACHELOR OF SCIENCE

#### MAJOR: FOOD SCIENCE AND TECHNOLOGY

**CONCENTRATION: FOOD TECHNOLOGY**

**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).
MAJOR REQUIREMENTS

Agricultural and Biological Sciences

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

Literature and Arts

Six credits selected from English, Art History, Communication, Music, Theatre, or Foreign language, or any 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, Geography, History, Philosophy, Political Science, Psychology, Sociology, or Women's Studies, or any courses cross-listed in these departments.

Professional Studies

CHM 101/102 General Chemistry 8
CHEM 213 Elementary Organic Chemistry 4
CHEM 214/216 Elementary Biochemistry with Lab 4
CHEM 220 Quantitative Analysis 3
CHEM 221 Quantitative Analysis Laboratory 1
PHYS 104 Elementary Physics 3
BISC 207/208 Introductory Biology I and II 8
BISC 371 Introduction to Microbiology 4
BISC 400 Nutrition Concepts 3
MATH 221/222 Calculus I and II 6
FREC 135 Introduction to Data Analysis 3
FREC 408 Research Methods 3

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 minimum of four credits of Special Problems/Independent Study (FOSC x66) may count toward this fulfillment of the requirement (FOSC 399, Teaching Assistant, may be taken one time allowing a maximum of 2 credits toward graduation.)

FOSC 165 Seminar: Food Science 1
FOSC 265 Seminar: Food Science 1
FOSC 328 Food Chemistry 4
FOSC 329 Food Analysis 4
FOSC 359 Topics in Food Science 4
FOSC 365 Seminar: Food Science 1
FOSC 409 Food Processing 4
FOSC 411 Food Science Capstone 4
FOSC 439 Food Microbiology 4
FOSC 445 Food Engineering Technology 4
FOSC 449 Food Biotechnology 4

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 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.

CREDITS TO TOTAL A MINIMUM OF: 128

HONORS BACHELOR OF SCIENCE: FOOD SCIENCE AND TECHNOLOGY

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science in Agriculture: 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 the program.

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 grade or 2.00 or higher is required in all FOSC courses for the minor.

FOSC 305/306 Food Science & Laboratory 3

Select any 3 courses from:

FOSC 328 Food Chemistry 12
FOSC 329 Food Analysis 3
FOSC 409 Food Processing 4
FOSC 411 Food Science Capstone 4
FOSC 439 Food Microbiology 4
FOSC 445 Food Engineering Technology 4
FOSC 449 Food Biotechnology 4

Prerequisites may be waived. Permission of instructor to register is based on individual student academic record and major. See a food science faculty member for advisement 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 engineering techniques in such areas as production mechanization, energy, 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 sciences and technical skills to support engineering activities.

The bioresources engineering technology curriculum is designed to prepare students for engineering-related employment in agricultural, 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 Agriculture 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) 3

MAJOR REQUIREMENTS

Communications

Six additional credits to provide training in oral and written communications 6
EGTE 365 Junior Seminar 1
A second writing course selected from: ENGL 301 Expository Writing 3

65
To graduate with a major in Bioresources 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**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL 110</td>
<td>Critical Reading and Writing (with minimum grade of C-)</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 301</td>
<td>Expository Writing</td>
<td>3</td>
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<tr>
<td>ENGL 302</td>
<td>Advanced Composition</td>
<td>3</td>
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<tr>
<td>ENGL 307</td>
<td>News Writing and Editing</td>
<td>3</td>
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<tr>
<td>ENGL 410</td>
<td>Technical Writing</td>
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<td>Technical Writing</td>
<td>3</td>
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<tr>
<td>ENGL 415</td>
<td>Writing for the Professions</td>
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**Technical Support**

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<th>Credits</th>
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<tbody>
<tr>
<td>PLSC 204</td>
<td>Introduction to Soil Science</td>
<td>4</td>
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</tbody>
</table>

A minimum of three credits in biology/life sciences or natural resources, excluding courses used to satisfy the Biology, Chemistry, and Physics groups. A minimum of eleven credits in the Bioresources Engineering Technology area.

Department or related courses approved by the student's advisor.

**Technical Support**

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</table>

To graduate with a major in Bioresources Engineering Technology, the student must attain an average 2.0 index in all courses with a BREG or EGTE prefix.
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 9
of the following areas: Anthropology, Art, Art History, Black
American Studies, Criminal Justice, Economics, Education, English,
Foreign Languages, Geography, History, Music, Philosophy, Political
Science, Psychology, Sociology, Theatre or Women's Studies, or cours-
es not 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 ............................................. 8
PHYS 207/208 Fundamentals of Physics I and II ...................................... 8
MATH 221/222 Calculus I and II ............................................................. 8
MATH 241/242 Analytic Geometry and Calculus A and B ...................... 6-8
STAT 201 Introduction to Statistics ......................................................... 3
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-
usite 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 of Thermodynamics ....................................... 3
EGTE 334 Rural/Urban Industrial Buildings ........................................... 3
Three credits selected from one of the following areas: Dynamics, Elec-
tronics, Mathematics, 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 Engineer-
ing 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
Elective course in technical design .......................................................... 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 com-
puter-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 tech-
niques can be applied towards degree requirements. For transfer stu-
dents, after matriculation in the program, course work will normally be lim-
ited to instrumentation and computer use.

Technical Specialization
One of the following (cannot be satisfied by transfer credit): .................. 3-4
EGTE 321 Storm Water Management ................................................... 3
EGTE 331 Mechanical Power Units ....................................................... 3
EGTE 435 Machinery Design and Development .................................... 3
EGTE 456 Fundamentals of HVAC ....................................................... 3
Additional courses in technical design ................................................. 5-6

To bring the total technical specialization credits to a minimum of nine.

Technical Management
FREC 201 Records and Accounts ......................................................... 3
ACCT 207 Accounting I ................................................................. 12
Additional courses in technical management ....................................... 12

Accounting credits cannot exceed six of the fifteen total credit hours. FREC
201 will not substitute for ACCT 207, ACCT 207 will substitute for FREC
201. It is recommended that ACCT 207 and ACCT 208 be taken. Other
courses can be selected from certain courses in Business Administration,
Engineering Technology or Food and Resource Economics.

Electives
After required courses are completed, sufficient elective credits must be
selected 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

Requirements for a Minor in Engineering Technology

A minor in engineering technology may be earned by a student in any
University bachelor degree program through successful comple-
tion of engineering technology courses in accordance with the
requirements listed here. All students must meet the required prereq-
usites for any engineering technology course before it is taken.
Before being admitted to the minor, the student must have success-
fully completed MATH 222 or MATH 242, CHEM 102 or CHEM
104, and PHYS 202 or PHYS 208. A grade point average of at least
2.0 is required in the 20 credits of engineering technology courses for
the minor and in the mathematics and science courses listed above.

The required engineering technology courses are:
EGTE 209 Computer Aided Drafting ................................................... 3
EGTE 111 Computer Applications in Engineering Technology ............. 3

67
An additional 14 credits in engineering technology must be taken of which at least 6 credits must be at the 300-level or higher. All engineering technology courses shall be selected with the approval of an advisor in the Department of Bioresources Engineering to meet each student's objectives. For students concerned with the environment, these courses might include EGTE 103, 104, and 328; for those interested in electronics, EGTE 244 and 344. Courses can also be chosen to give the student's minor an emphasis in other areas such as manufacturing, mechanics, or technical management.

### 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.

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

### DEGREE: BACHELOR OF SCIENCE

#### MAJORS: ENTOMOLOGY

<table>
<thead>
<tr>
<th>CURRICULUM</th>
<th>CREDITS</th>
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</thead>
<tbody>
<tr>
<td><strong>UNIVERSITY REQUIREMENTS</strong></td>
<td></td>
</tr>
<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>
</tbody>
</table>

#### MAJOR REQUIREMENTS

**Computer Science**

Computer Science course (FREC 135 or equivalent) | 3

**Agricultural and Biological Sciences**

One course in any of the following areas: Food and Resource Economics (except FREC 135), Food Science, Bioresources Engineering, or Animal Science (except ANSC 300) | 3-4

**Literature and Arts**

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

**Social Sciences and Humanities**

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

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

<table>
<thead>
<tr>
<th>Professional Studies</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 115/171 Pre-Calculus or higher level</td>
<td>3</td>
</tr>
<tr>
<td>BISC 207 Introductory Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BISC 208 Introductory Biology II</td>
<td>4</td>
</tr>
<tr>
<td>BISC 302 General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101/102 General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103/104 General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>ENTO 205 Elements of Entomology</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 305 Entomology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>ENTO 406 Insect Identification-Taxonomy</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 465 Seminar</td>
<td>1</td>
</tr>
<tr>
<td>ENTO 300 Principles of Animal and Plant Genetics</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 405 Insect Structure and Function</td>
<td>4</td>
</tr>
<tr>
<td>ENTO 408 Field Taxonomy</td>
<td>2</td>
</tr>
<tr>
<td>ENTO courses (may include 3 credits maximum of Independent Study, Research, and Field Experience)</td>
<td>6</td>
</tr>
</tbody>
</table>

Nine credits from the following:

- BISC XXX Any biology course at or above 300-level (except BISC 302)
- PLSC 151 Introduction to Crop Science
- PLSC 201 Botany I
- PLSC 204 Introduction to Soil Science
- PLSC 211 Herbaceous Landscape Plants
- PLSC 212 Woody Landscape Plants
- PLSC 303 Introductory Plant Pathology
- PLSC 402 Plant Taxonomy

<table>
<thead>
<tr>
<th>ELECTIVES</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

**CREDITS TO TOTAL A MINIMUM OF** 124

### DEGREE: BACHELOR OF SCIENCE

#### MAJOR: WILDLIFE CONSERVATION

<table>
<thead>
<tr>
<th>CURRICULUM</th>
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<tbody>
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<td><strong>UNIVERSITY REQUIREMENTS</strong></td>
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<tr>
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</tr>
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<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

Computer Science course (FREC 135 or equivalent) | 3

Agricultural and Biological Sciences

One course in any of the following areas: Food and Resource Economics (except FREC 135), Food Science, Bioresources Engineering, or Animal Science (except ANSC 300) | 3-4

Literature and Arts

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

Social Sciences and Humanities

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

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

<table>
<thead>
<tr>
<th>Professional Studies</th>
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</tr>
</thead>
<tbody>
<tr>
<td>MATH 115, 171, 221, or 241</td>
<td>3-4</td>
</tr>
<tr>
<td>BISC 207/208 Introductory Biology I and II</td>
<td>8</td>
</tr>
<tr>
<td>BISC 302 General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101/102 General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103/104 General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>ENTO 201 Wildlife Conservation and Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 205 Elements of Entomology</td>
<td>3</td>
</tr>
<tr>
<td>ENTO 305 Entomology Laboratory</td>
<td>2</td>
</tr>
</tbody>
</table>
ENTO 325 Wildlife Management ............................................. 3
ENTO 415 Wildlife Research Techniques .............................. 3
ENTO 465 Seminar .......................................................... 1
ENTO courses (may include 3 credits maximum of 6 credits) 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 .....................................................
MAST 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 206 Physical Geography: Topography-Soils .................
GEOG 107 Physical Geology .............................................
PHYS 201 Introductory Physics I ........................................
PHYS 202 Introductory Physics II .......................................
PLSC 204 Introduction to Soil Science ............................... 3

GROUP II: 7-8 credits from the following: ............................. 7-8
ANSC 140 Functional Anatomy of Domestic Animals ............... 4
BISC 301 Molecular Biology of the Cell .............................
BISC 303 Genetic and Evolutionary Biology ....................... 3
BISC 305 Cell Physiology .................................................
BISC 306 General Physiology ...........................................
BISC 312 General Ecology Lab .........................................
BISC 324 Invertebrate Zoology .........................................
BISC 371 Introduction to Microbiology ..............................
BISC 442 Vertebrate Morphology ......................................
BISC 495 Evolution ....................................................... 3
BISC 480 Vertebrate Natural History ...................................
BISC 637 Population Ecology .......................................... 3
ENTO 300 Principles of Animal and Plant Genetics ............... 4
ENTO 310 Animal and Plant Genetics Laboratory (same as PLSC 300, 310; may not count for both Group II and III)
MAST 627 Marine Biology .................................................

GROUP III: 7-8 credits from the following: ............................. 7-8
PLSC 101 Botany I ...........................................................
PLSC 201 Botany II .........................................................
PLSC 212 Woody Landscape Plants ...................................
PLSC 300 Principles of Animal and Plant Genetics ............... 4
PLSC 306 Plant Molecular Biology ....................................
PLSC 310 Animal and Plant Genetics Lab (same as ENTO 300, 310; may not count for both Group II and III)
PLSC 402 Plant Taxonomy .................................................
PLSC 410 Introduction to Plant Physiology .........................
PLSC 420 Plant Physiology Laboratory ..............................

GROUP IV: 6 credits from the following: ................................ 6
Only 3 credits may count toward the College Literature and Arts Group Requirement
AGRI 212 Oral Communication in Agriculture and Natural Resources .................................................................
COMM 255 Fundamentals of Communication .......................
COMM 312 Oral Communication in Business .......................
COMS 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 .......................................... 3
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 or
GEOG 250 Computer Methods in Geography ....................
FREC 408 Research Methods I ...........................................
FREC 409 Research Methods II ........................................
FREC 480 Geographic Information Systems in Natural Resources Management
MATH 221 Calculus I ..................................................... 3

MATH 222 Calculus II ....................................................
MATH 230 Finite Mathematics with Applications .................
STAT 200 Basic Statistical Practice .................................. 3

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 (Either 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 256 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 ............................
SOC 210 Population Problems ....................................... 3

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 also 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 courses including ENTO 205, 305, and 406. The remaining 10 credits must come from ENTO 214, 224, 315, 405, 408, 411, or 440. 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.

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.
PLANT PROTECTION

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

DEGREE: BACHELOR OF SCIENCE
MAJOR: PLANT PROTECTION

CURRICULUM

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) 3

MAJOR REQUIREMENTS

Computer Science

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, Bioresources Engineering, Animal Science, Entomology and Applied Ecology, and 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 with these departments 6

Social Sciences and Humanities

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

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 3
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 470 Weed Biology and Control 4
PLSC 411 Diagnostic Plant Pathology 3
PLSC 470 Weed Biology and Control 4
A plant production course selected from PLSC 105, 133, 213, or 302 3-4
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

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 in the agribusiness complex. Courses and curricula are designed to provide a thorough background in the principles of organization and management of agribusiness firms serving agriculture and food processing businesses. Food and resource economics also 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, agricultural economics, and statistics. The curricula differ in the amount of emphasis given to agricultural production, business and economics. All the curricula qualify the student for graduate work. The department also offers Natural Resource Management, an interdisciplinary major. Minors in Food and Agricultural Management and in Statistics 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 as part of the food and agribusiness management major.

The major in agricultural economics emphasizes resource and environmental economics, quantitative methods, and agricultural marketing, 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 resource economics is offered as part of the agricultural economics major.

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

DEGREE: BACHELOR OF SCIENCE
MAJOR: FOOD AND AGRIBUSINESS MANAGEMENT

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

Agricultural and Biological Sciences

Minimum of one course in three of the following areas: Bioresources Engineering, Animal Science, Food Science, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology 9

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 with these departments 6

Physical Sciences

Minimum of eight credits selected from Chemistry, Physics, Geology, or Biology 8

Professional Studies

MATH 115 Pre-Calculus or higher level (MATH 221, MATH 230, and STAT 201 are strongly recommended) 3
ACCT 207/208 Accounting I and II 6
COM 312 Oral Communication in Business 3
ENGL 512 Written Communications in Business 3
ECON 151 Introduction to Microeconomics: Prices and Markets 3
ECON 152 Introduction to Macroeconomics: National Economy 3
BUAD 301 Introduction to Marketing 3
A concentration in food marketing is offered as part of the food and agribusiness management major.

The study of food and resource economics is concerned with agribusiness management, food marketing, and the economics of resource management and production in the agribusiness complex. Courses and curricula are designed to provide a thorough background in the principles of organization and management of agribusiness firms serving agriculture and food processing businesses. Food and resource economics also 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, agricultural economics, and statistics. The curricula differ in the amount of emphasis given to agricultural production, business and economics. All the curricula qualify the student for graduate work. The department also offers Natural Resource Management, an interdisciplinary major. Minors in Food and Agricultural Management and in Statistics are also available.

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DEGREE: BACHELOR OF SCIENCE
MAJOR: FOOD AND AGRIBUSINESS MANAGEMENT

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

Agricultural and Biological Sciences

Minimum of one course in three of the following areas: Bioresources Engineering, Animal Science, Food Science, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology 9

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 with these departments 6

Physical Sciences

Minimum of eight credits selected from Chemistry, Physics, Geology, or Biology 8

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Undergraduate major programs are offered in food and agribusiness management, agricultural economics, and statistics. The curricula differ in the amount of emphasis given to agricultural production, business and economics. All the curricula qualify the student for graduate work. The department also offers Natural Resource Management, an interdisciplinary major. Minors in Food and Agricultural Management and in Statistics 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 as part of the food and agribusiness management major.

The major in agricultural economics emphasizes resource and environmental economics, quantitative methods, and agricultural marketing, 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 resource economics is offered as part of the agricultural economics major.

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http://ag.udel.edu/departments/frec/index.html
AGRI 165  Mastering the Freshman Year ........................................... 1
FREC 110  Introduction to Food and Agribusiness Industry ............... 1
FREC 135  Introduction to Data Analysis ........................................ 3
FREC 150  Economics of Agriculture and Natural Resources ............. 3
FREC 240  Quantitative Methods in Agricultural Economics .............. 3
FREC 345  Strategic Selling and Buyer Communication ..................... 3
FREC 404  Food and Fiber Marketing ............................................ 3
FREC 405  Management and Leadership Development ....................... 3
FREC 408  Research Methods I ................................................... 3
FREC 409  Research Methods II .................................................. 3
FREC 410  International Agricultural Trade and Marketing ............... 3
FREC 430  Establishing and Managing a Food and Agribusiness Enterprise .................................................. 3

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

ELECTIVES
After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only four credits of activity-type Physical Education and/or four credits of performing Music credit may be counted toward the degree. Included in the free electives are suggested Food and Resource Economics courses from the following areas:

Suggested Food and Agribusiness Management Electives:
FREC 212  Food Retailing and Product Management ....................... 3
FREC 335  Advanced Data Management ....................................... 3
FREC 427  Agribusiness Financial Management ............................... 3
FREC 471  Futures and Options Markets ...................................... 3
FREC 464  Agribusiness Internship ............................................. 3

Suggested Resource Management Electives:
FREC 406  Agriculture and Natural Resource Policy .................... 3
FREC 424  Resource Economics ................................................ 3
FREC 429  Community Economic Development ............................... 3
FREC 444  Economics of Environmental Management ................... 3
FREC 480  Geographic Information Systems in Natural Resource Management .................................................. 3

Suggested Communications and Writing Electives:
ENGL 301  Expository Writing .................................................. 3
ENGL 410  Technical Writing .................................................... 3

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

DEGREE: BACHELOR OF SCIENCE
MAJOR: AGRICULTURAL ECONOMICS
CURRICULUM

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. 37)

MAJOR REQUIREMENTS
Agricultural and Biological Sciences ........................................ 9
Minimum of one course in three of the following areas: Food Science, Bioresources Engineering, 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
ENGL 312  Written Communications in Business ............................... 3

MAJOR 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. 37)

MAJOR REQUIREMENTS
Agricultural and Biological Sciences ........................................ 9
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Professional Studies
MATH 115  Pre-Calculus (MATH 221 or higher is strongly recommended) .. 3
ENGL 312  Written Communications in Business ............................... 3

MAJOR REQUIREMENTS
ENGL 110  Critical Reading and Writing (with a minimum grade of C) .... 3
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Agricultural and Biological Sciences ........................................ 9
Minimum of one course in three of the following areas: Food Science, Bioresources Engineering, 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
ENGL 312  Written Communications in Business ............................... 3

MAJOR 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. 37)
DEGREE: BACHELOR OF SCIENCE

MAJOR: AGRICULTURAL ECONOMICS

CONCENTRATION: RESOURCE ECONOMICS

The requirements for the major in Agricultural Economics must be met. In addition, five of the following six FREC courses must be taken:

- FREC 406 Agriculture and Natural Resource Policy
- FREC 424 Resource Economics: Theory and Policy
- FREC 429 Rural Economics Development: Theory and Policy
- FREC 444 Economics of Environmental Management
- FREC 450 Environmental Law and Policy
- FREC 480 Geographic Information Systems in Natural Resource Management

Three additional courses from the College of Business and Economics as required for the Agricultural Economics major plus an additional course (three courses total) must all be taken from the following courses:

- ECON 306 Economic Theory of Politics
- ECON 408 Economics of Law
- ECON 411 Economics of Growth and Development
- ECON 415 Economic Forecasting
- ECON 422 Econometric Methods and Models I
- ECON 423 Econometric Methods and Models II
- ECON 426 Mathematical Economic Analysis
- ECON 433 Economics of the Public Sector
- ECON 475 Economics of Natural Resources
- ECON 477 Benefit-Cost Analysis

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE

MAJOR: STATISTICS

CREDITS

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).

COLLEGE REQUIREMENTS

Skill Requirements

Writing: (minimum grade C) ... 3

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 81.)

Foreign Language:

Completion of the intermediate-level course (107 or 112) in a given language. 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 82)

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 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 210 Discrete Mathematics I ... 3
- MATH 242 Analytic Geometry and Calculus B ... 4
- MATH 243 Analytic Geometry and Calculus C ... 4
- MATH 245 Concepts of Analysis ... 3
- MATH 349 Elementary Linear Algebra ... 3
- MATH 302 Ordinary Differential Equations ... 3
- MATH 426 Introduction to Numerical Analysis and Algorithmic Computation ... 3
- MATH 401 Introduction to Real Analysis ... 3
- STAT 205 Statistical Methods ... 4
- STAT 370 Introduction to Statistical Analysis I ... 3
- STAT 371 Introduction to Statistical Analysis II ... 3
- STAT 418 Sampling Methods ... 3
- STAT 420 Data Analysis and Nonparametric Statistics ... 3
- STAT 611 Regression Analysis ... 3
- STAT 613 Design and Analysis of Experiments ... 3

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 ... 3

Two-semester sequence of laboratory science. (Courses designed for non-majors in a discipline are not appropriate.)

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

- CISC 181 Introduction to Computer Science
- CISC 220 Data Structures

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

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

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

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

Area of application: ... 15

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

ELECTIVES

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

CREDITS TO TOTAL A MINIMUM OF 128

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 300 or STAT 370 and a total of at least 12 credits in statistics above STAT 300. Credit toward the minor can be obtained for both STAT 300 and STAT 370, but credit toward the minor will not be given for both STAT 300 and STAT 371.

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
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

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**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: GENERAL AGRICULTURE**

**CURRICULUM**

<table>
<thead>
<tr>
<th>UNIVERSITY REQUIREMENTS</th>
<th>CREDITS</th>
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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>
</tbody>
</table>

**MAJOR REQUIREMENTS**

**Mathematics and Computer Science**

Mathematics course | 3 |
Computer Science course (FREC 135 or equivalent) | 3 |

**Agricultural and Biological Sciences**

Minimum of one course in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Biosources Engineering, Animal Science, Entomology and Applied Ecology, Plant and Soil Sciences.

**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.

**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
- GEOL 105 and 106

**Communications**

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

A minimum of one course in oral communications chosen from the following: AGRI 212 Oral Communication.

**GROUP III: 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 |
---|---|

---

**NATURAL RESOURCE MANAGEMENT**

Natural Resource Management is an interdisciplinary undergradu- ate 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 man- aging the use and perpetuation of natural resources in the 21st centu- ry, 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.
### ENVIRONMENTAL SOIL SCIENCE, LANDSCAPE HORTICULTURE, AND PLANT BIOLOGY

Undergraduate students often are involved in some aspect of these research programs, which strengthens and broadens their understanding of science.

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

### CURRICULUM

<table>
<thead>
<tr>
<th>DEGREE: BACHELOR OF SCIENCE</th>
<th>MAJOR: ENVIRONMENTAL SOIL SCIENCE</th>
<th>CREDITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIVERSITY REQUIREMENTS</td>
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</tr>
<tr>
<td>ENGL 110 Critical Reading and Writing (minimum grade C)</td>
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<tr>
<td>Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 57).</td>
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<tr>
<td>MAJOR REQUIREMENTS</td>
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<tr>
<td>Computer Science</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Agricultural and Biological Sciences</td>
<td>One course in any of the following areas: Animal Science, Food Science, Entomology and Applied Ecology, or Biology.</td>
<td>3-4</td>
</tr>
<tr>
<td>Literature and Arts</td>
<td>Three credits selected from English, Art, Art History, Communication, Music, Theatre, or Foreign Language, or courses cross-listed in these departments.</td>
<td>3</td>
</tr>
<tr>
<td>Social Sciences and Humanities</td>
<td>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.</td>
<td>6</td>
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<tr>
<td>Professional Studies</td>
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<tr>
<td>CHEM 101/102 General Chemistry I and II</td>
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<tr>
<td>CHEM 103/104 General Chemistry I and II</td>
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<tr>
<td>CHEM 213 Organic Chemistry</td>
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<td>4</td>
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<tr>
<td>CHEM 220/221 Quantitative Analysis with Lab</td>
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<td>4</td>
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<tr>
<td>ENGL 410 Technical Writing</td>
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<tr>
<td>GEOG 220 Meteorology</td>
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<td>GEOG 107 General Geology I</td>
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<tr>
<td>MATH 221 Calculus I</td>
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<tr>
<td>PHYS 201 Introductory Physics I</td>
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<tr>
<td>PISC 101 Botany I</td>
<td></td>
<td>3</td>
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<tr>
<td>PISC 151 Introduction to Crop Science</td>
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<tr>
<td>PISC 204 Introduction to Soil Science</td>
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<td>4</td>
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<tr>
<td>PISC 319 Environmental Soil Microbiology</td>
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<td>4</td>
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<tr>
<td>PISC 401 Agronomic Crop Science</td>
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<td>3</td>
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<tr>
<td>PISC 438 Fate and Transport of Contaminants in Soil</td>
<td></td>
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<tr>
<td>PISC 608 Soil Chemistry</td>
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<td>3</td>
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<tr>
<td>One of the following two courses:</td>
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<tr>
<td>FREC 480 Geographic Information Systems in Natural Resource Management</td>
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<tr>
<td>GEOG 372 Geographic Information Systems</td>
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<tr>
<td>Three of the following four courses:</td>
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<td>8-9</td>
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<tr>
<td>EGTE 103 Land and Water Management</td>
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<tr>
<td>EGTE 113 Land Surveying</td>
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<tr>
<td>EGTE 328 Agricultural Waste Management</td>
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<tr>
<td>FREC 150 Economics of Agriculture and Natural Resources</td>
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</tbody>
</table>

### ELECTIVES

**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 often are involved in some aspect of these research programs, which strengthens and broadens their understanding of science.

Students can major in Plant Science, Landscape Horticulture, Plant Biology or Environmental Soil Science. Minors are offered in Environmental Soil Science, Landscape Horticulture, and Plant Biology.

### CREDITS TO TOTAL A MINIMUM OF

**130 CREDITS**

### CURRICULUM

<table>
<thead>
<tr>
<th>GROUP IV</th>
<th>Ecosystems: 6 credits from</th>
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<tr>
<td>PLSC 302</td>
<td>General Ecology</td>
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<td>ENTO 325</td>
<td>Wildlife Management</td>
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<tr>
<td>ENTO/PLSC 440 Integrated Disease and Pest Management</td>
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<tr>
<td>GEOG 235</td>
<td>Conservation of Natural Resources</td>
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<tr>
<td>or</td>
<td>GEOG 236 Conservation: Global Issues</td>
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<td>or</td>
<td>GEOG 230 Humans and Earth Ecosystem</td>
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<tr>
<td>or</td>
<td>PLSC 305 Environmental Soil Management</td>
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<tr>
<th>GROUP V:</th>
<th>Plants and Animals: 6 credits from</th>
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<tbody>
<tr>
<td>BISC 371</td>
<td>Introduction to Microbiology</td>
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<tr>
<td>ENTO 205</td>
<td>Elements of Entomology</td>
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<tr>
<td>ENTO 305</td>
<td>Entomology Laboratory</td>
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<tr>
<td>ENTO 406</td>
<td>Insect Identification - Taxonomy</td>
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<td>ENTO 318</td>
<td>Taxonomy of Birds</td>
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<tr>
<td>ENT 410</td>
<td>Animal Biology</td>
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<tr>
<td>ENT 425</td>
<td>Mammmalogy</td>
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<tr>
<td>ENT 426</td>
<td>Aquatic Insects</td>
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<tr>
<td>PLSC 212</td>
<td>Woody Landscape Plants</td>
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<tr>
<td>PLSC 303</td>
<td>Introductory Plant Pathology</td>
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<tr>
<td>PLSC 402</td>
<td>Plant Taxonomy</td>
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<tr>
<th>GROUP VI:</th>
<th>Land and Water Management: 6 credits from</th>
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<tbody>
<tr>
<td>EGTE 103</td>
<td>Land and Water Management</td>
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<tr>
<td>EGTE 113</td>
<td>Land Surveying</td>
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<td>EGTE 328</td>
<td>Waste Management Systems</td>
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<td>GEOG 107</td>
<td>General Geology</td>
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<td>GEOG 101</td>
<td>Physical Geography</td>
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<td>GEOG 206</td>
<td>Physical Geography: Topography-Soils</td>
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<td>GEOG 220</td>
<td>Meteorology</td>
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<td>GEOG 225</td>
<td>Water and Society</td>
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<tr>
<th>GROUP VII:</th>
<th>Natural Resource/Environmental Policy: 12 credits from</th>
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<tbody>
<tr>
<td>[Including a minimum of six credits in Food and Resource Economics]</td>
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<tr>
<td>ECON 306</td>
<td>Public Choice</td>
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<td>ECON 332</td>
<td>Public Finance and Fiscal Policy</td>
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<td>ECON 360</td>
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<td>EGTE 416</td>
<td>Project Economics Analysis</td>
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<td>FREC 406</td>
<td>Agriculture and Natural Resource Policy</td>
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<td>FREC 429</td>
<td>Community Economic Development</td>
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<td>FREC 450</td>
<td>Environmental Law and Policy</td>
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<td>POSC 220</td>
<td>Introduction to Public Policy</td>
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<td>POSC 350</td>
<td>Politics and the Environment</td>
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<tr>
<th>GROUP VIII:</th>
<th>Ethics: 3 credits from</th>
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<tbody>
<tr>
<td>PHIL 200</td>
<td>Business Ethics</td>
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<tr>
<td>PHIL 202</td>
<td>Contemporary Moral Problems</td>
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<td>PHIL 203</td>
<td>Ethics</td>
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<td>PHIL 340</td>
<td>Cross Cultural Environmental Economics</td>
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<tr>
<td>PHIL 448</td>
<td>Environmental Ethics</td>
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</tbody>
</table>

**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 CREDITS**
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:

PLSC 204 Introduction to Soil Science ........................................ 4
PLSC 305 Environmental Soil Management .................................. 4
Three of the following five courses: ............................................. 9-10
PLSC 151 Introduction to Crop Science
PLSC 319 Environmental Soil Microbiology
PLSC 401 Agronomic Crop Science
PLSC 603 Soil Physics
PLSC 608 Environmental Soil Chemistry

DEGREE: BACHELOR OF SCIENCE

MAJOR: LANDSCAPE HORTICULTURE

CURRICULUM

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 ................................................................. 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 ................................................................. 3

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

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 .......................................... 4
PLSC 201 Botany II .................................................................. 4
PLSC 204 Introduction to Soil Science ....................................... 4
PLSC 211 Herbaceous Landscape Plants .................................... 3
PLSC 212 Woody Landscape Plants .......................................... 3
PLSC 300 Principles of Animal and Plant Genetics ................. 4
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
AORI 212 Oral Communication in Agricultural Sciences
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 352 Law and Social Issues in Business
CNST 200 Consumer Economics
CNST 242 Consumer Movement in Perspective
ECON 151 Introduction to Microeconomics
ECON 152 Introduction to Macroeconomics

Three credits selected from English, Art, Art History, Communication, Music, Theatre, or Foreign Language, or courses cross-listed in these departments ................................................................. 9

PLSC 101 Botany I .................................................................. 4
PLSC 133 Ornamental Horticulture .......................................... 4
PLSC 204 Introduction to Soil Science ....................................... 4

DEGREE: BACHELOR OF SCIENCE

MAJOR: PLANT BIOLOGY

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)

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

Agricultural and Biological Sciences
One course in any of the following areas: Food Science, Bioresources Engineering, Animal Science, or Entomology and Applied Ecology ................................................................. 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 ................................................................. 3

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

Professional Studies
BISC 207 Introductory Biology I ................................................. 4
BISC 371 Introduction to Microbiology ....................................... 4
CHEM 101/102 General Chemistry I and II .............................. 8
CHEM 321/322 Organic Chemistry ............................................ 8
CHEM 213 Elementary Organic Chemistry ............................. 4
CHEM 214/216 Elementary Biochemistry and Lab ...................... 3
CHEM 527 Biochemistry ........................................................... 3
One of the following Communication courses: ............................................. 3
AGRI 212 Oral Communication in Ag Sciences
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 ................................................................. 1
Other Life Science Courses ................................................... 12
Minimum of four courses with at least six credits at the 400-level or above. See advisor for list of approved courses in various interest areas

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 201 or higher Introductory Physics
(Recommended for students interested in graduate school)
CHEM 220/221 Quantitative Analysis

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

REQUIREMENTS FOR A MINOR IN PLANT BIOLOGY
The minor in Plant Biology is open to students in any major and requires a minimum of 15 credits from the following:
PLSC 101 Botany I (4 cr.) ...................................................... 4
PLSC 201 Botany II (4 cr.) ..................................................... 4
PLSC 204 Introduction to Soil Science (4 cr.) ................................ 4
PLSC 300 Principles of Plant and Animal Genetics (3 cr) .................. 3
PLSC 303 Introductory Plant Pathology (4 cr.) .............................. 4
PLSC 306 Introduction to Plant Molecular Biology (3 cr) .................. 3
PLSC 402 Plant Taxonomy (3 cr.) ............................................ 3
PLSC 410 Plant Physiology (3 cr.) ............................................ 3
PLSC 411 Diagnostic Plant Pathology (3 cr) ................................. 3
PLSC 414 Plant Cell and Tissue Culture (4 cr) ............................... 4
PLSC 416 Plant Virology (4 cr.) .............................................. 4
PLSC 435 Plant Development Biology (3 cr) ................................. 3
PLSC 440 Integrated Pest and Disease Management (3 cr) ............... 3
PLSC 444 The Physiology of Plant Stress (3 cr) ............................. 3
PLSC 602 Physiological Plant Productivity (3 cr) ............................ 3
PLSC 605 Plant Breeding (3 cr) .............................................. 3
PLSC 607 Plant and Soil Water Relations (3 cr) ............................. 3
PLSC 615 Vascular Plant Anatomy (3 cr) ................................... 3

DEGREE: BACHELOR OF SCIENCE
MAJOR: PLANT SCIENCE

CURIUM

CReditS

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

Agricultural and Biological Sciences ...................................... 9
Minimum of one course in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Bioresearch, 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
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.

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

Professional Studies
CHM 101 General Chemistry I and II or
CHM 103/104 General Chemistry I and II ..................................... 8
CHEM 213 Elementary Organic Chemistry .................................. 4

One of the following: .......................................................... 3-4
PHYS 101 Introduction to Physics
CHEM 105 General Geology
CHEM 214 Elementary Biochemistry
PLSC 101 Botany I ................................................................. 4
PLSC 201 Botany II ................................................................. 4
PLSC 204 Introduction to Soil Science ........................................ 4
PLSC 300 Principles of Animal and Plant Genetics ....................... 3
PLSC 303 Introductory Plant Pathology ...................................... 4
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 College 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 curriculum. The student must complete a minimum of 62 credit hours, with at least 30 of the credits earned within at least four of the five departments in the college. A minimum of 32 credits for the degree must be earned at the University of Delaware. In addition, the recipient must 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 year in which all requirements for the degree are to be completed and must, at the time of application, be enrolled in the college. 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 courses in agriculture. This approach would allow the student to more easily 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.