COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

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

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

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

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

PREVETERINARY INSTRUCTION

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

AGRICULTURE AND NATURAL RESOURCES

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

DEGREE: BACHELOR OF SCIENCE
MAJOR: AGRICULTURE AND NATURAL RESOURCES

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AGRICULTURAL AND NATURAL RESOURCES  

Agricultural and Biological Sciences  

Minimum of one course in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Animal Science, Entomology and Wildlife 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, 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, SCEN 101/102 

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 in Agriculture and Natural Resources, COMM 200 Introduction to Human Communication Systems, COMM 255 Fundamentals of Communication, COMM 312 Oral Communication in Business, COMM 350 Public Speaking, COMM 356 Small Group Communication 

Literature and Arts  

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

Within the college  

Thirty additional credits from any of the following departments: fifteen credits of the 30 must be at the 300 level or higher 

Food and Resource Economics, Bioresources Engineering, Agricultural and Technology Education, Animal Science, Entomology and Wildlife Ecology, Food Science, Plant and Soil Sciences 

A maximum of twelve credits of Special Problem/Independent Study credits in all areas may be counted toward the degree, with a maximum of six credits in any one department 

ELECTIVES  

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

CREDITS TO TOTAL A MINIMUM OF 124 

AGRICULTURAL AND TECHNOLOGY EDUCATION  

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

The Agricultural and Natural Resources Education concentration provides students with an opportunity to gain a broad understanding and professional preparation in the areas of animal science, plant and soil sciences, food science, engineering technology, entomology and wildlife conservation, resource economics, agribusiness, natural resource management, and biotechnology. Students develop and practice their leadership skills through participation in FFA activities and other student organizations. 

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

Both concentrations provide the pedagogical skills that give the student a pragmatic hands-on program that uses an investigative, scientific, design-and-construct, and problem-solving approach to teaching. The curriculum is designed to allow students to teach in classroom and laboratory settings using modern technology and techniques. 

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

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DEGREE: BACHELOR OF SCIENCE  
MAJOR: AGRICULTURAL AND TECHNOLOGY EDUCATION  

CURRICULUM  

UNIVERSITY REQUIREMENTS  

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

MAJOR REQUIREMENTS  

Computer Science  

Computer Science course (FREC 135 or equivalent) 

Agricultural and Biological Sciences  

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

Literature and Arts  

Nine credits from English, Art, Art History, Communication, Music, Theatre, 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, Women's Studies, or courses cross-listed in these departments 

Professional Studies  

ATED 480 Career and Technical Education Materials & Approaches I 

ATED 481 Career and Technical Education Materials & Approaches II 

EDUC 419 Diversity in the Classroom (fulfills the University multicultural requirement) 

EDUC 413 Educational Psychology-Social Aspects 

EDUC 414 Educational Psychology-Cognitive Aspects 

EDUC 420 Reading in the Content Area 

EDUC 430 Classroom Management 

EDUC 400 Student Teaching 

The Agricultural and Technology Education program requires a 2.5 minimum overall GPA and successful completion of the requirements of Praxis I for enrollment in ATED 480 and ATED 481, and successful completion of the requirements of Praxis II content area as identified by the state of Delaware for enrollment in EDUC 400, Student Teaching. The teacher education program advisor (see list on p. 226) should be consulted for other policies concerning qualifications for student teaching. 

A minimum grade of C- is required in all ATED and EDUC courses 

In addition to completing the requirements of the core curriculum in Agricultural and Technology Education, students must complete the requirements for a concentration in Agricultural and Natural Resources Education or a concentration in Technology Education, as listed below.
DEGREE: BACHELOR OF SCIENCE
MAJOR: AGRICULTURAL AND TECHNOLOGY
EDUCATION
CONCENTRATION: AGRICULTURAL AND NATURAL RESOURCES EDUCATION

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

MATH 114 (or higher level) 3

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

Technical Agriculture & Natural Resources Courses 30
A 2.75 index in at least thirty credits of technical agriculture and natural resources courses from at least three departments in the college. Students are to meet with their Agricultural and Technology Education advisor before selecting these courses.

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

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE
MAJOR: AGRICULTURAL AND TECHNOLOGY
EDUCATION
CONCENTRATION: TECHNOLOGY EDUCATION

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

Mathematics 3
MATH 115 Pre-Calculus or higher level (MATH 221 strongly recommended; students taking MATH 115 will also need FREC 240 or equivalent)

Physical Sciences 11-12
CHEM 101/102 or 103/104 and a Physics course
PHYS 201/202 or 207/208 and a Chemistry course

Technology Courses 30
A 2.75 index in at least thirty credits of technology courses in the three focus areas: communications, physical, and bio-related, with at least six credit hours in each area. The remaining twelve credits are to be selected from one of the focus areas matching the student’s interest. Students are to meet with their Agricultural and Technology Education advisor before selecting these courses.

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

CREDITS TO TOTAL A MINIMUM OF 124

ANIMAL AND FOOD SCIENCES

The Department of Animal and Food Sciences offers undergraduate 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: pre-veterinary medicine, animal biotechnology, applied animal science, and general animal science. Students interested in pursuing graduate studies in the animal sciences are well prepared by available course work and laboratory experiences. Students interested in veterinary medicine have the opportunity to obtain 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 Science major.

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

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E-mail: kra@udel.edu
http://ag.udel.edu

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

CURIUMULUM

UNIVERSITY REQUIREMENTS

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

Three credits in approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see pp. 60-63) 3

MAJOR REQUIREMENTS

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

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

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

Social Sciences and Humanities 9
Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women’s Studies, or courses cross-listed in these departments
MAT 115 or higher 3
BISC 207/208 Introductory Biology I and II 8
CHEM 101/102 General Chemistry I and II 8
or
CHEM 103/104 General Chemistry I and II 8
ANSC 101 Introduction to Animal Science 3
ANSC 111 Animal Science Laboratory 1
ANSC 140 Functional Anatomy 4
ANSC 251 Livestock Nutrition and Feeding 4
ANSC 265 Sophomore Seminar 1
ANSC 300 Principles of Animal and Plant Genetics 3
ANSC 332 Introduction to Animal Diseases 3
One course from the following: 3-4
ANSC 345 Comparative Physiology of Domestic Animals
ANSC 441 Reproductive Physiology of Domestic Animals
ANSC 442 Lactational Physiology
One course from the following: 4
ANSC 404 Dairy Production
ANSC 417 Beef Cattle and Sheep Production
ANSC 418 Swine Production
ANSC 421 Poultry Production
Elective Animal Science courses for a total of 30 ANSC credits 3-4

No more than five credits of ANSC 266, 366, 466, or 666 Special Problems/Independent Study may be used for the major. ANSC 399 may be taken one time for a maximum of 2 credits toward graduation.

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

Recommended Electives
FREC 201 Records and Accounts
ANSC 270 Biotechnology: Science and Socioeconomic Issues
ANSC 399 Teaching Assistant
ANSC 420 Equine Management
BISC 300 Introduction to Microbiology
COMM 350 Public Speaking
ENGL 312 Written Communications in Business

CREDITS TO TOTAL A MINIMUM OF 124

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

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (with minimum grade of C) 3
Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63) 3

MAJOR REQUIREMENTS
AGRI 165 Mastering the Freshman Year 1
Computer Science course (FREC 135 or equivalent) 3

Agricultural and Biological Sciences 6-8
Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Entomology and Wildlife Ecology (except ENWC 300), or Plant and Soil Sciences (except PLSH 300)

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

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

MAT 221 Calculus I 3
BISC 207/208 Introductory Biology I and II 8
BISC 401 Molecular Biology of the Cell 4
CHEM 101/102 General Chemistry I and II 8
or
CHEM 103/104 General Chemistry I and II 8
CHEM 321/322 Organic Chemistry 8
One of the following: 3-6
CHEM 527 Introductory Biochemistry
CHEM 214/216 Elementary Biochemistry
CHEM 641/642 Biochemistry

PHYS 201/202 Introductory Physics I and II 8

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

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing (with minimum grade of C) 3
Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63) 3

MAJOR REQUIREMENTS
AGRI 165 Mastering the Freshman Year 1
Computer Science course (FREC 135 or equivalent) 3

Agricultural and Biological Sciences 6-8
Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Entomology and Wildlife Ecology (except ENWC 300), or Plant and Soil Sciences (except PLSH 300)
Agricultural and Biological Sciences (except FREC 135), Food Science, Engineering Technology, Entomology and Wildlife Ecology (except ENWC 300), or Plant and Soil Sciences (except PLSC 300)

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

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

**UNIVERSITY REQUIREMENTS**

1. All the University requirements for the Honors degree (see page 45)
2. All the University requirements for the Honors degree (see page 45)

Courses with the ANSC prefix taken at the 600-level or higher are considered to be Honors courses in the major. One 3- or 4-credit course in PLSC, ENWC, or BISC will, if taken as Honors, count toward the 12 Honors credits required in the major or in collateral disciplines.

**REQUIREMENTS FOR A MINOR IN ANIMAL SCIENCE**

The minor in animal science requires 19 credits in animal science including:
ANSC 101; 111; 140; 251; one course from ANSC 404, 417, 418, 420, and 421; and one course from ANSC 332, 345, 441, 436, and 454.
DEGREE: BACHELOR OF SCIENCE
MAJOR: FOOD SCIENCE AND TECHNOLOGY
CONCENTRATION: FOOD SCIENCE

CURRICULUM

CREDITS

UNIVERSITY REQUIREMENTS

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

Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related course content (see p. 60-63) 3

MAJOR REQUIREMENTS

AGRI 165 Mastering the Freshman Year 1

Agricultural and Biological Sciences

One course in one of the following areas: Engineering Technology, Animal Science, Entomology and Wildlife Ecology, or Plant and Soil Sciences 3-4

Literature and Arts

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

Social Sciences and Humanities

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

Professional Studies

CHEM 101/102 General Chemistry or
CHEM 103/104 General Chemistry 8
CHEM 214 Elementary Biochemistry or
CHEM 527 Introductory Biochemistry 3
PHYS 201/202 Introductory Physics I and II 8
BISC 207/208 Introductory Biology I and II 8
BISC 300 Introduction to Microbiology 4
CHEM 220 Quantitative Analysis I 3
CHEM 221 Quantitative Analysis Laboratory 1
CHEM 321/322 Organic Chemistry 8
CHEM 418 Introductory Physical Chemistry 3
NDT 200 Nutrition Concepts 3
MATH 221/222 Calculus I and II 8
MATH 241/242 Analytic Geometry and Calculus A and B 8-6
FREC 135 Introduction to Data Analysis 3
FREC 408 Research Methods 3
FOSC 102 Food for Thought 3
FOSC 265 Seminar: Food Science 1
FOSC 305 Food Science 3
FOSC 328 Food Chemistry 4
FOSC 329 Food Analysis 4
FOSC 359 Topics in Food Science 1
FOSC 409 Food Processing 4
FOSC 411 Food Science Capstone 4
FOSC 439 Food Microbiology 4
FOSC 445 Food Engineering Technology 4
FOSC 449 Food Biotechnology 4

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

ELECTIVES

After required courses are completed, sufficient credits must be taken to meet the minimum credits required for the degree. Only two credits of activity-type Physical Education, 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.

Recommended Electives

CHEM 419 Introductory Physical Chemistry
CHEM 445 Physical Chemistry Laboratory

CREDITS TO TOTAL A MINIMUM OF: 124

HONORS BACHELOR OF SCIENCE: FOOD SCIENCE AND TECHNOLOGY

The recipient of this degree must complete:
1. All requirements for the Bachelor of Science: Food Science and Technology (either concentration)
2. All the University requirements for the Honors degree (see page 45). Courses in Food Science taken at the 600-level or higher are considered to be Honors courses in the major. One 3 or 4-credit required course in a related technical area, if taken as Honors, may count toward the total of Honors credits required in the major or in collateral disciplines.

CREDITS TO TOTAL A MINIMUM OF: 124
DEGREE: BACHELOR OF SCIENCE
MAJOR: ENGINEERING TECHNOLOGY

CURRICULUM

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing 3

Three credits in an approved course or courses stressing
multicultural, ethnic, and/or gender-related course content (see p.60-63) 3

MAJOR REQUIREMENTS

Communications
A second writing course selected from:
ENGL 301 Expository Writing
ENGL 302 Advanced Composition
ENGL 307 News Writing and Editing
ENGL 312 Written Communications in Business
ENGL 410 Technical Writing
ENGL 415 Writing for the Professions

An oral communications course selected from:
COMM 200 Introduction to Human Communication Systems
COMM 255 Fundamentals of Communication
COMM 312 Oral Communication in Business
COMM 350 Public Speaking
COMM 356 Small Group Communication
AGRI 212 Oral Communications in Agriculture and Natural Resources

Social Sciences and Humanities
ECON 151 Introduction to Microeconomics 3
ECON 152 Introduction to Macroeconomics 3

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

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

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

Technical Skills
EGTE 115 Introduction to Computer Based Problem Solving 4
EGTE 209 Technical and Computer Aided Drafting 3

Technical Skills elective 3

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

Technical Specialization
25 to 31 credits of EGTE or engineering courses at the 300 or 400 level from
departmental approved list. At least 15 credits must be EGTE courses.
A minor in a technical or business subject area is strongly encouraged
With a minor, the requirements for a technical specialization are a
minimum of 25 credits 31 to 25

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

CREDITS TO TOTAL A MINIMUM OF 124

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

BIORESOURCE ENGINEERING

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

ENGINEERING TECHNOLOGY

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

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

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

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

Telephone: (302)831-2468
http://ag.udel.edu

REQUIREMENTS FOR A MINOR IN FOOD SCIENCE

The minor in food science requires 15 food science credits. Course selection
depends on completion of prerequisites and other science and math preparation
1. The minor in Food Science requires a minimum of 15 food science credits,
including FOSC 305/306 (3 cr), and any 3 other FOSC courses above the
300 level
2. A C grade or 2.0 or higher is required in all FOSC courses.
3. Successful completion of MATH 221/222 Calculus I and II (6 credits) math-
ematics courses is required prior to taking food science courses for the
minor

FOSC 305/306 Food Science & Laboratory 3
Select any 3 courses from:
FOSC 328 Food Chemistry
FOSC 329 Food Analysis
FOSC 409 Food Processing
FOSC 411 Food Science Capstone
FOSC 439 Food Microbiology
FOSC 445 Food Engineering Technology
FOSC 449 Food Biotechnology

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

CREDITS TO TOTAL A MINIMUM OF 15
To graduate with a major in engineering technology, a student must attain at least a 2.0 average in ETGE courses and must earn at least a C- in all prerequisite courses to qualify for admission to the next course. This requirement is in addition to the University requirement of a 2.0 grade point average. A student must complete a minimum of 48 semester hours in technical sciences, technical skills, and technical specialization.

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

#### CURRICULUM

#### UNIVERSITY REQUIREMENTS

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>ENGL 110</td>
<td>Critical Reading and Writing</td>
<td>3</td>
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Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related course content (see p. 60-63).

#### MAJOR REQUIREMENTS

**Communications**
- A second writing course selected from:
  - ENGL 301 Expository Writing
  - ENGL 302 Advanced Composition
  - ENGL 307 News Writing and Editing
  - ENGL 312 Written Communications in Business
  - ENGL 410 Technical Writing
  - ENGL 415 Writing for the Professions

An oral communications course selected from:
- COMM 200 Introduction to Human Communication Systems
- COMM 255 Fundamentals of Communication
- COMM 312 Oral Communication in Business
- COMM 350 Public Speaking
- COMM 356 Small Group Communication
- AGRI 212 Oral Communications in Agriculture and Natural Resources

**Social Sciences and Humanities**
- ECON 151 Introduction to Microeconomics
- ECON 152 Introduction to Macroeconomics

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

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

Additional MATH credits to bring total MATH credits at 201 level above to 12 credits

**Technical Skills**
- EGTE 104 Introduction to Surveying
- EGTE 115 Introduction to Computer Based Problem Solving

**Technical Support**
- An additional computer programming language
- Approved Technical Support Electives

#### CREDITS TO TOTAL A MINIMUM OF

124

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

To graduate with a major in engineering technology, a student must attain at least a 2.0 average in ETGE courses and must earn at least a C- in all prerequisite courses to qualify for admission to the next course. This requirement is in addition to the University requirement of a 2.0 grade point average. A student must complete a minimum of 48 semester hours in technical sciences, technical skills, and technical specialization.
This program requires basic sciences as well as specialty courses on insects. Flexibility in course selection permits students to emphasize pest management or insect biology. The Wildlife Conservation major is for students with interests in the biological aspects of environmental science, e.g., conservation, wildlife biology, or ecology. It requires basic sciences, specialty courses in vertebrates, insects, plants, and conservation and other supporting areas. The curriculum’s flexibility accommodates career goals ranging from research to nature education, conservation advocacy and wildlife management. Meeting the requirements for the Wildlife Conservation major will provide the student with the minimum educational requirements for certification as an Associate Wildlife Biologist by The Wildlife Society, a professional society. An Honors Degree option is offered for both majors. The department also offers minors in both Entomology and Wildlife Conservation and co-offers Natural Resource Management and Plant Protection as interdisciplinary majors.

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

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

Telephone: (302) 831-2508
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http://ag.udel.edu

DEGREE: BACHELOR OF SCIENCE
MAJOR: ENTOMOLOGY

CURRICULUM

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

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63) 3

MAJOR REQUIREMENTS

Technical Support
ACCT 207 or FREC 201 3

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

CREDITS TO TOTAL A MINIMUM OF 124

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 completion of a minimum of 20 credits in engineering technology courses in accordance with the requirements listed here. Before taking each engineering technology course, the student must satisfy required prerequisites for the course. A grade point average of at least 2.0 is required in the 20 credits of engineering technology courses for the minor.

The required engineering technology courses are:
EGTE 115 Introduction to Computer Based Problem Solving 4

One course from the following list:
EGTE 215 Applied Fluid Mechanics 4
EGTE 231 Fundamentals of Statics and Strength of Materials 4
EGTE 244 Electricity for Engineering Technology 4

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

ENTOMOLOGY AND WILDLIFE ECOLOGY

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

The Department offers two undergraduate majors. Students can focus their biological interest on insects in the Entomology major.
American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed with these departments.

<table>
<thead>
<tr>
<th>Minimum of one course in two of the following areas:</th>
<th>Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed with these departments.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture and Biological Sciences</td>
<td>Minimum of one course in two of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, or Animal Science (except ANSC 300).</td>
</tr>
<tr>
<td>Literature and Arts</td>
<td>Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed with these departments.</td>
</tr>
<tr>
<td>Social Sciences and Humanities</td>
<td>A minimum grade of C is required for all ENWC credits used to satisfy departmental requirements.</td>
</tr>
</tbody>
</table>

**ELECTIVES**

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

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

**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: PLANT PROTECTION**

**CREDITS**

**PLANT PROTECTION**

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENWC 101/102</td>
<td>General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>ENWC 205</td>
<td>Elements of Entomology</td>
<td>3</td>
</tr>
<tr>
<td>ENWC 305</td>
<td>Entomology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>ENWC 406</td>
<td>Insect Identification—Taxonomy</td>
<td>3</td>
</tr>
<tr>
<td>ENWC 465</td>
<td>Senior Seminar</td>
<td>1</td>
</tr>
<tr>
<td>ENWC 300</td>
<td>Principles of Animal and Plant Genetics</td>
<td>3</td>
</tr>
<tr>
<td>ENWC 405</td>
<td>Insect Structure and Function</td>
<td>4</td>
</tr>
<tr>
<td>ENWC 408</td>
<td>Field Taxonomy</td>
<td>3</td>
</tr>
</tbody>
</table>

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

Nine credits from any of the following:

- Any BISC XXX course or courses at or above 300 level (except BISC 302 and 321)
- PLSC 151 Introduction to Crop Science
- PLSC 201 Botany II
- PLSC 204 Introduction to Soil Science
- PLSC 211 Herbaceous Landscape Plants
- PLSC 212 Woody Landscape Plants
- PLSC 303 Introductory Plant Pathology
- PLSC 402 Plant Taxonomy

**ELECTIVES**

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

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63)

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

**DEGREE: BACHELOR OF SCIENCE**

**MAJOR: WILDLIFE CONSERVATION**

**CURRICULUM**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 115/117</td>
<td>Pre-Calculus or higher level</td>
<td>3</td>
</tr>
<tr>
<td>BISC 207/208</td>
<td>Introductory Biology I and II</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 101/102</td>
<td>General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>CHEM 103/104</td>
<td>General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>ENWC 205</td>
<td>Elements of Entomology</td>
<td>3</td>
</tr>
<tr>
<td>ENWC 305</td>
<td>Entomology Laboratory</td>
<td>2</td>
</tr>
<tr>
<td>ENWC 406</td>
<td>Insect Identification—Taxonomy</td>
<td>3</td>
</tr>
<tr>
<td>ENWC 411</td>
<td>Insect Pest Management</td>
<td>3</td>
</tr>
<tr>
<td>ENWC 465</td>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>PLSC 101</td>
<td>Botany I</td>
<td>4</td>
</tr>
<tr>
<td>PLSC 201</td>
<td>Botany II</td>
<td>4</td>
</tr>
<tr>
<td>PLSC 303</td>
<td>Introductory Plant Pathology</td>
<td>4</td>
</tr>
<tr>
<td>PLSC 411</td>
<td>Diagnostic Plant Pathology</td>
<td>3</td>
</tr>
<tr>
<td>PLSC 470</td>
<td>Weed Biology and Control</td>
<td>4</td>
</tr>
</tbody>
</table>

A plant production course selected from PLSC 105, 133, or 302

Nine additional ENWC and/or PLSC credits plus 3 credits of related internship, Independent Study, Research or Field Experience

**ELECTIVES**

Beyond required courses, sufficient credits must be taken to meet the minimum credits required for the degree. Courses in agriculture, biology, statistics, and the physical sciences and additional writing courses are recommended. Only two credits of 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**

**DEPARTMENT REQUIREMENTS**

**CURRICULUM**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 110</td>
<td>Critical Reading and Writing (with minimum grade of C)</td>
<td>3</td>
</tr>
</tbody>
</table>

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science course (FREC 135 or equivalent)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Agricultural and Biological Sciences**

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literature and Arts</td>
<td>Three credits (not from Group II) from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed with these departments</td>
<td>3</td>
</tr>
</tbody>
</table>

**Social Sciences and Humanities**

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>A maximum grade of C is required for all ENWC credits used to satisfy departmental requirements.</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

**Professional Studies**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 115, 171, 221, or 241</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>BISC 207/208</td>
<td>Introductory Biology I and II</td>
<td>8</td>
</tr>
<tr>
<td>BISC 302</td>
<td>General Ecology</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101/102</td>
<td>General Chemistry</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 103/104</td>
<td>General Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>ENWC 201</td>
<td>Wildlife Conservation and Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENWC 205</td>
<td>Elements of Entomology</td>
<td>3</td>
</tr>
</tbody>
</table>
**ENWC 300** Principles of Animal and Plant Genetics .......................... 3
or
**BISC 403** Genetics and Evolutionary Biology .................................. 3
**ENWC 318** Taxonomy of Birds ...................................................... 2
**ENWC 325** Wildlife Management ................................................... 3
**ENWC 406** Insect Identification-Taxonomy ...................................... 3
**ENWC 415** Wildlife Research Techniques ..................................... 3
**ENWC 418** Avian Biology .............................................................. 3
**ENWC 425** Mammalogy ................................................................. 3
**ENWC 465** Senior Seminar ........................................................... 1
**ENWC credit** (may include UNIV 400 or any ENWC course 200-level or above [except X66 and X68]) May double count with Group I or III as appropriate) .................. 3

**ECON 151** Introduction to Microeconomics: Prices and Markets ............ 3 (may double count in Soc. Sci. Group)

**FREC 408** Research Methods I ...................................................... 3
or
**STAF 200** Basic Statistical Practice ................................................. 3
**PLSC 101** Botany I ........................................................................... 4
**PLSC 204** Introduction to Soil Science ........................................... 3
**PLSC 212** Woody Landscape Plants .............................................. 4
or
**PLSC 344** Forest Ecology (same as ENWC 344) .................................. 2
or
**PLSC 402** Plant Taxonomy ........................................................... 3

**GROUP I**: 10 credits from the following:

- **ANSC 140** Functional Anatomy of Domestic Animals ..................... 3
- **BISC 300** Introduction to Microbiology ...................................... 3
- **BISC 305** Cell Physiology .......................................................... 3
- **BISC 306** General Physiology ...................................................... 3
- **BISC 442** Vertebrate Morphology ............................................. 3
- **BISC 480** Vertebrate Natural History ...................................... 3
- **BISC 495** Evolution ................................................................. 3
- **BISC 637** Population Ecology .................................................. 3
- **ENWC 310** Animal and Plant Genetics Laboratory ....................... 3
- **ENWC 408** Insect Field Taxonomy ........................................... 3
- **ENWC 424** Herpetology ........................................................... 3
- **MAST 627** Marine Biology ........................................................ 3
- **MAST 629** Ichthyology .............................................................. 3

**GROUP II**: 9 credits from the following:

- **AGRI 212** Oral Communication in Agriculture and Natural Resources .... 3
- **COMM 312** Oral Communication in Business .................................. 3
- **COMM 350** Public Speaking ....................................................... 3
- **ENGL 301** Expository Writing .................................................. 3
- **ENGL 307** News Writing and Editing ....................................... 3
- **ENGL 309** Feature and Magazine Writing .................................. 3
- **ENGL 312** Written Communications in Business ......................... 3
- **ENGL 410** Technical Writing .................................................... 3
- **GEOG 427** Applied Environmental Science .................................. 3 (may also count for Soc. Sci. Group above)
- **THEA 204** Introduction to Voice and Speech ............................... 3
- **UNIV 402** Senior Thesis (requires completed thesis) ....................... 3

**GROUP III**: 6 credits from the following:

- **ENWC 413** Human Dimensions in Wildlife Conservation .............. 3 (may also be counted in Professional Studies)
- **FREC 444** Economics of Environmental Management .................. 3
- **GEOG 236** Conservation: Global Issues ..................................... 3
- **PHIL 448** Environmental Ethics ............................................... 3
- **POSC 350** Politics and the Environment ...................................... 3

**ELECTIVES**: Beyond required courses, sufficient credits must be taken to meet the minimum credits required for the degree. Calculus, organic chemistry, biochemistry, geographic information systems, and physics are strongly recommended. Only two credits of 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

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**REQUIREMENTS FOR A MINOR IN ENTOMOLOGY**

The minor in entomology requires 18 credits of ENWC courses including ENWC 205, 305, 406, and 408. A minimum grade of C is required in all courses totaling 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 ENWC courses including ENWC 201, 325 and three courses from among ENWC 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 ENWC 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 totaling toward the minor. Credits for Special Problem, Independent Study, Research, and Field Experience do not count toward the minor. Because of the high demand for some ENWC courses required for Wildlife Conservation majors, the department cannot guarantee that students will be able to register for all courses needed to complete the Wildlife Conservation Minor. Students also should note that some of ENWC courses have BISC 302 as a prerequisite. Students who do not have that course may be at a different disadvantage in some upper level ENWC courses.

**FOOD AND RESOURCE ECONOMICS**

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

Undergraduate majors are offered in food and agribusiness management, resource economics, food business management and technology, 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 Food Resource Management, an interdisciplinary major. Minors in Food and Agribusiness Management, Resource Economics, Statistics, and Operations Research are also available.

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

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

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**UNDERGRADUATE AGRICULTURE AND NATURAL RESOURCES**
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 multi-cultural, ethnic, and/or gender-related course content (see p. 60-63) 3

MAJOR REQUIREMENTS

Agricultural and Biological Sciences

FREC 212 Food Retailing and Consumer Behavior 3
FREC 335 Advanced Data Management 3
FREC 427 Agribusiness Financial Management 3
FREC 471 Futures and Options Markets 4

Two Business Administration Courses at the 400-level in marketing related areas. These are in addition to BUAD 301-Introduction to Marketing and two additional Business and Economics courses at the 300 and 400 level required by the Food and Agribusiness Management major. 6

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

CREDITS TO TOTAL A MINIMUM OF: 128

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

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

FREC 212 Food Retailing and Consumer Behavior 3
FREC 335 Advanced Data Management 3
FREC 427 Agribusiness Financial Management 3
FREC 471 Futures and Options Markets 4

Two Business Administration Courses at the 400-level in marketing related areas. These are in addition to BUAD 301-Introduction to Marketing and two additional Business and Economics courses at the 300 and 400 level required by the Food and Agribusiness Management major. 6

REQUIREMENTS FOR A MINOR IN FOOD AND AGRIBUSINESS MANAGEMENT

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

Marketing/Management Area:
FREC 305 Management and Leadership Development 3
FREC 316 Economics of Biotechnology and New Technologies 3
FREC 404 Food and Fiber Marketing 3
FREC 409 Research Methods II 3
FREC 410 International Agricultural Trade and Marketing 3
FREC 427 Agribusiness Financial Management 3

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

FOOD BUSINESS MANAGEMENT AND TECHNOLOGY

Food business management and technology is an interdepartmental undergraduate major administered by the Departments of Animal and Food Sciences and Food and Resource Economics. This degree program provides students with a strong background encompassing major elements necessary for working in the food sector, especially in positions where liaison among technical and nontechnical groups is important. The combination of fields represented in the curriculum leads to a better overall understanding of the food industry from product development and quality control to sales and marketing. In addition to working in the food and agribusiness industries, students will also be prepared for careers in government or further study in a graduate program.

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http://ag.udel.edu

DEGREE: BACHELOR OF SCIENCE
MAJOR: FOOD BUSINESS MANAGEMENT AND TECHNOLOGY

CURRICULUM

UNIVERSITY REQUIREMENTS

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

Suggested Resource Management Electives:
FREC 406 Agriculture and Natural Resource Policy
FREC 424 Resource Economics
FREC 429 Community Economic Development
FREC 444 Economics of Environmental Management
FREC 480 Geographic Information Systems in Natural Resource Management
Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p 60-63)  

**MAJOR REQUIREMENTS**  

**Agricultural and Biological Sciences**  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BISC 207</td>
<td>Introductory Biology I</td>
</tr>
<tr>
<td>CHEM 103</td>
<td>General Chemistry I and II</td>
</tr>
<tr>
<td>CHEM 104</td>
<td>General Chemistry I and II</td>
</tr>
<tr>
<td>MATH 221</td>
<td>Pre-Calculus</td>
</tr>
<tr>
<td>AGRI 165</td>
<td>Mastering the Freshman Year</td>
</tr>
<tr>
<td>FREC 135</td>
<td>(FREC 335 recommended)</td>
</tr>
<tr>
<td>FREC 316</td>
<td>Economics of Biotechnology and New Technology</td>
</tr>
<tr>
<td>FREC 345</td>
<td>Strategic Selling and Buyer Communication</td>
</tr>
<tr>
<td>FREC 404</td>
<td>Food and Fiber Marketing</td>
</tr>
<tr>
<td>FREC 408</td>
<td>Research Methods I</td>
</tr>
<tr>
<td>FOSC 102</td>
<td>Food for Thought</td>
</tr>
<tr>
<td>FOSC 305</td>
<td>Food Science</td>
</tr>
<tr>
<td>FOSC 409</td>
<td>Food Processing</td>
</tr>
<tr>
<td>FOSC 411</td>
<td>Food Science Capstone</td>
</tr>
</tbody>
</table>

**Literature and Arts**  

Six credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed with those 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, Women's Studies, or courses cross-listed with those departments  

**Physical Sciences**  

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

**Professional Studies**  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 115</td>
<td>Pre-Calculus</td>
</tr>
<tr>
<td>COMM 312</td>
<td>Oral Communication in Business</td>
</tr>
<tr>
<td>ENGL 312</td>
<td>Written Communications in Business</td>
</tr>
<tr>
<td>ECON 151</td>
<td>Introduction to Microeconomics: Prices and Markets</td>
</tr>
<tr>
<td>ECON 152</td>
<td>Introduction to Macroeconomics: National Economy</td>
</tr>
<tr>
<td>ECON 301</td>
<td>Intermediate Microeconomic Theory</td>
</tr>
<tr>
<td>ECON 302</td>
<td>Banking and Monetary Policy</td>
</tr>
<tr>
<td>ECON 303</td>
<td>Intermediate Macroeconomic Theory</td>
</tr>
</tbody>
</table>

Two additional courses offered by the College of Business and Economics at the 300-level or higher:  

**ECON 150** Economics of Agriculture and Natural Resources  

**CREDITS TO TOTAL A MINIMUM OF**  

124

**MAJOR REQUIREMENTS**  

**Agricultural and Biological Sciences**  

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

**Social Sciences and Humanities**  

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

**Physical Sciences**  

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

**Professional Studies**  

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 115</td>
<td>Pre-Calculus</td>
</tr>
<tr>
<td>COMM 312</td>
<td>Oral Communication in Business</td>
</tr>
<tr>
<td>ENGL 312</td>
<td>Written Communications in Business</td>
</tr>
<tr>
<td>ECON 151</td>
<td>Introduction to Microeconomics: Prices and Markets</td>
</tr>
<tr>
<td>ECON 152</td>
<td>Introduction to Macroeconomics: National Economy</td>
</tr>
<tr>
<td>ECON 301</td>
<td>Intermediate Microeconomic Theory</td>
</tr>
<tr>
<td>ECON 302</td>
<td>Banking and Monetary Policy</td>
</tr>
<tr>
<td>ECON 303</td>
<td>Intermediate Macroeconomic Theory</td>
</tr>
</tbody>
</table>

Two additional courses offered by the College of Business and Economics at the 300-level or higher:  

**ECON 150** Economics of Agriculture and Natural Resources  

**ECON 201** Records and Accounts  

**ECON 240** Quantitative Methods in Agricultural Economics  

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

1. **Theory**  

**FREC 404** Food and Fiber Marketing  

**FREC 410** International Agricultural Trade and Marketing  

**FREC 424** Resource Economics  

**FREC 444** Economics and Environmental Management  

**FREC 471** Futures and Options Markets  

2. **Methods**  

**FREC 408** Research Methods I  

**FREC 409** Research Methods II  

**FREC 427** Agribusiness Financial Management  

**FREC 480** Geographic Information Systems in Natural Resource Management  

3. **Policy**  

**FREC 406** Agriculture and Natural Resource Policy  

**FREC 420** Agriculture in Economic Development  

**FREC 429** Community Economic Development  

**FREC 450** Topics in Environmental Law  

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

**ELECTIVES**  

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

**ELECTIVES**  

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

**CREDITS TO TOTAL A MINIMUM OF**  

124

**DEGREE:** BACHELOR OF SCIENCE  

**MAJOR:** RESOURCE ECONOMICS  

**CREDITS**

**UNIVERSITY REQUIREMENTS**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 110</td>
<td>Critical Reading and Writing (with a minimum grade of C)</td>
</tr>
</tbody>
</table>

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p 60-63)  

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that language by taking an exemption examination. French, Russian or German is
school work in a single foreign language may attempt to fulfill the requirement in
designated in the semester's Registration. Booklet (See list of courses approved for
high school study of foreign language Students with four or more years of high
completion of 90 credit hours. Appropriate writing courses are normally
recommended
second writing requirement, page 87-89 ..)
faculty critique of both composition and content. This course must be token after
requirements for the Environmental Economics concentration.
Two additional courses from the College of Business and Economics as required
for the Resource Economics major, plus an additional course (three courses total)
must be taken from the following courses:
ECON 306 Economic Theory of Politics
ECON 408 Economics of Law
ECON 415 Economic Forecasting
ECON 422 Econometric Methods and Models I
ECON 423 Econometric Methods and Models II
ECON 426 Mathematical Economic Analysis
ECON 433 Economics of the Public Sector
ECON 475 Economics of Natural Resources
ECON 477 Benefit-Cost Analysis

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

REQUIREMENTS FOR A MINOR IN RESOURCE ECONOMICS

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

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

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

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

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

DEGREE: BACHELOR OF SCIENCE
MAJOR: STATISTICS

CURRICULUM CREDITS

UNIVERSITY REQUIREMENTS
ENGL 110 Critical Reading and Writing
minimum grade C) 3

Three credits in an approved course or courses stressing multi-cultural, ethnic,
and/or gender-related content course (see page 60-63) 3

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 87-89];

Foreign language: 0-12
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 89-94)
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 205 Statistical Methods
MATH 210 Discrete Mathematics I
MATH 242 Analytic Geometry and Calculus B
MATH 243 Analytic Geometry and Calculus C
MATH 245 Concepts of Analysis
MATH 349 Elementary Linear Algebra
MATH 351 Ordinary Differential Equations
MATH 426 Introduction to Numerical Analysis and
Algorithmic Computation
MATH 416 Introduction to Real Analysis
STAT 370 Introduction to Statistical Analysis I
STAT 371 Introduction to Statistical Analysis II
STAT 418 Sampling Methods
STAT 420 Data Analysis and Nonparametric Statistics
STAT 611 Regression Analysis
STAT 615 Design and Analysis of Experiments

One of the following:
STAT 616 Design and Analysis of Experiments II
STAT 617 Multivariate Methods
STAT 618 Sampling Techniques
ENGL 312 Written Communications in Business

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

One of the following options (A, B, or C): 6-9
Option A (for students with previous experience with a programming language)
CISC 181 Introduction to Computer Science
and
CISC 220 Data Structures

Option B (for students with no previous experience with a programming language)
CISC 105 General Computer Science
and
CISC 181 Introduction to Computer Science
and
CISC 220 Data Structures

Option C (for students with no previous experience with a programming language)
CISC 105 General Computer Science
and
CISC 120 Object Oriented Programming in C++
and
CISC 220 Data Structures

Any one course from the following list

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 370, 371, 611 Regression Analysis, and
FREC 474 crosslisted as STAT 674 Applied Data Base Management. Three
additional credit hours in statistics are required above STAT 371. Credit toward
the minor will not be given for STAT 475. A minimum grade of C is required in all
courses counting toward the minor.
REQUIREMENTS FOR A MINOR IN OPERATIONS RESEARCH

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

Required courses: (6 hours)
- ORES 401: An Introduction to Operations Research
- STAT 370: Introduction to Statistical Analysis I

Remaining four courses are to be selected from the following list:
- STAT 371: Introduction to Statistical Analysis II
- FREC 335: Advanced Data Management
- FREC 409: Research Methods II
- FREC 474: Applied Data Base Management
- MATH 389: Graph Theory
- MATH 529: Linear Programming-Applications and Methods
- ECON 415: Economic Forecasting
- BUAD 306: Operations Management
- CIEG 482: Systems Design and Operation
- CIEG 486*: Engineering Management
- EGTE 401: Introduction to Quality Control
- EGTE 402: Quality Control Applications
- EGTE 416*: Project Economic Analysis
- EGTE 417: Project Management

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

NATURAL RESOURCE MANAGEMENT

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

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

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

http://ag.udel.edu

DEGREE: BACHELOR OF SCIENCE
MAJOR: NATURAL RESOURCE MANAGEMENT

CURRICULUM

UNIVERSITY REQUIREMENTS

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

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63) 3

MAJOR REQUIREMENTS

Literature and Arts: Six credits selected from English, Art, Art History, Communication, Music, Theatre, Foreign Language, or courses cross-listed in these departments (minimum of one course in two of the following areas: Anthropology, Black American Studies, Criminal Justice, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, Women's Studies, or courses cross-listed in these departments)

Professional Studies
- AGRI 165: Mastering the Freshman Year
  (or any equivalent Department freshman seminar) 1
- BISC 207/208: Introductory Biology I and II
  or
- PLSC 101: Botany I
  4
- CHEM 101/102: General Chemistry I and II
  or
- CHEM 103/104: General Chemistry I and II
  8
- ECON 151: Introduction to Microeconomics
  3
- ECON 152: Introduction to Macroeconomics
  3
- ENVC 201: Wildlife Conservation and Ecology
  3
- MATH 221/222: Calculus I and II
  6
- FREC 135: Introduction to Data Analysis
  3
- FREC 150: Economics of Agriculture and Natural Resources
  3
- FREC 424: Resource Economics: Theory and Policy
  3
- FREC 444: Economics of Environmental Management
  3
- FREC 480: Geographic Information Systems in Natural Resource Management
  4
- PLSC 201: Botany II
  4
- PLSC 204: Introduction to Soil Science
  4

GROUP I: Communications:

6 credits from the following:

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

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

GROUP II: Chemistry/Physics:

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

GROUP III: Statistics:

6 credits from:
- FREC 408/409: Research Methods I and II
  or
- MATH 201/202: Introduction to Statistics I and II

GROUP IV: Ecosystems:

6 credits from:
- BISC 302: General Ecology
- ENVC 235: Wildlife Management
- ENVC 471: Integrated Disease and Pest Management
- PLSC 440: (or any equivalent Department freshman seminar)
  or
- ENVC 411: Insect Pest Management
- GEOG 235: Conservation of Natural Resources
  or
- GEOG 236: Conservation: Global Issues
  or
- GEOG 300: Humans and Earth Ecosystem
- PLSC 305: Environmental Soil Management

GROUP V: Plants and Animals:

6 credits from:
- BISC 300: Introduction to Microbiology
- ENWC 205: Elements of Entomology
- ENWC 305: Entomology Laboratory
- ENWC 406: Insect Identification - Taxonomy
- ENWC 318: Taxonomy of Birds
- ENWC 418: Avian Biology
- ENWC 425: Mammalogy
- ENWC 426: Aquatic Insects

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

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

Agriculture and Natural Resources

REGISTRATION INFORMATION

Undergraduate

DEGREE: BACHELOR OF SCIENCE
MAJOR: ENVIRONMENTAL SOIL SCIENCE

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

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (minimum grade of C) .... 3
Three credits in an approved course or courses stressing multicultural, ethnic,
and/or gender-related course content (see p 60-63) .... 3

MAJOR REQUIREMENTS

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

Agricultural and Biological Sciences

Two courses in any of the following areas: Animal Science, Food Science, Food
and Resource Economics (except FREC 135), Entomology and Wildlife Ecology, or
Biology

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

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

Professional Studies

CHEM 101/102 General Chemistry I and II .... 8

One of the following two courses: .... 2-4
FREC 480 Geographic Information Systems in Natural Resource Management
or
GEOG 372 Geographic Information Systems

Three of the following courses: .... 8-9
EGTE 103 Land and Water Management
EGTE 113 Land Surveying
EGTE 328 Agricultural Waste Management
FREC 150 Economics of Agriculture and Natural Resources

ELECTIVES

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

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

HONORS BACHELOR OF SCIENCE:
NATURAL RESOURCE MANAGEMENT

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Natural Resource Management

2. All of the University’s requirements for the Honors Baccalaureate degree

Courses at the 600-level that satisfy requirements in the major will be con-
sidered to be Honors courses for the degree.

PLANT AND SOIL SCIENCES

Plant and Soil Sciences includes disciplines of study that apply
cultural, biological, and physical principles toward insuring adequate food supplies in a safe and aesthetic environment. Faculty in the department have active teaching and research programs in plant molecular biology, botany, anatomy, physiology, taxonomy, genetics, plant breeding, cell and tissue culture, pathology, ornamental horticulture, landscape design, crop and vegetable science, soil chemistry, soil management, soil physics, and soil microbiology. Undergraduate students are often 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. The department also co-offers the interdisciplinary majors Natural Resource Management and Plant Protection.

PLSC 212 Woody Landscape Plants
PLSC 303 Introductory Plant Pathology
PLSC 402 Plant Taxonomy

GROUP VII: Land and Water Management:

6 credits from:
EGTE 103 Land and Water Management
EGTE 104 Introduction to Land Surveying
EGTE 328 Waste Management Systems
GEOG 107 General Geology
GEOG 101 Physical Geography: Climatic Processes
GEOG 106 Physical Geography: Land Surface Processes
GEOG 420 Meteorology
GEOG 320 Water and Society

GROUP VII: Natural Resource/Environmental Policy:

12 credits from [including a minimum of six credits from FREC choices]:
ECON 306 Public Choice
ECON 332 Public Finance and Fiscal Policy
ECON 360 Government and Business
EGTE 416 Project Economics Analysis
FREC 406 Agriculture and Natural Resource Policy
FREC 429 Community Economic Development
FREC 450 Environmental Law and Policy
POSC 220 Introduction to Public Policy
POSC 350 Politics and the Environment

GROUP VIII: Ethics:

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

ELECTIVES

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

HONORS BACHELOR OF SCIENCE:
NATURAL RESOURCE MANAGEMENT

The recipient of this degree must complete:

1. All requirements for the Bachelor of Science: Natural Resource Management

2. All of the University’s requirements for the Honors Baccalaureate degree

Courses at the 600-level that satisfy requirements in the major will be con-
sidered to be Honors courses for the degree.

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (minimum grade of C) .... 3
Three credits in an approved course or courses stressing multicultural, ethnic,
and/or gender-related course content (see p 60-63) .... 3

MAJOR REQUIREMENTS

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

Agricultural and Biological Sciences

Two courses in any of the following areas: Animal Science, Food Science, Food
and Resource Economics (except FREC 135), Entomology and Wildlife Ecology, or
Biology

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

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

Professional Studies

CHEM 101/102 General Chemistry I and II .... 8

One of the following two courses: .... 2-4
FREC 480 Geographic Information Systems in Natural Resource Management
or
GEOG 372 Geographic Information Systems

Three of the following courses: .... 8-9
EGTE 103 Land and Water Management
EGTE 113 Land Surveying
EGTE 328 Agricultural Waste Management
FREC 150 Economics of Agriculture and Natural Resources

ELECTIVES

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

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

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

- PLS 201 Botany I 
- PLS 303 Principles of Animal and Plant Genetics 
- PLS 305 Environmental Soil Management 
- PLS 306 Principles of Animal and Plant Genetics 
- PLS 364 Ornamental Horticulture Internship 
- PLS 390 Plant Physiology 
- PLS 395 Issues in Horticulture 
- PLS 470 Weed Biology and Control 

One of the following five courses:
- PLS 201 Botany I 
- PLS 203 Botany II 
- PLS 204 Introduction to Soil Science 
- PLS 205 Introduction to Soil Science Lab 
- PLS 211 Herbaceous Landscape Plants 

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63) 

DEGREE: BACHELOR OF SCIENCE
MAJOR: LANDSCAPE HORTICULTURE

CREDITS

REQUIREMENTS FOR A MINOR IN ENVIRONMENTAL SOIL SCIENCE

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

- PLS 101 Botany I 
- PLS 133 Ornamental Horticulture 
- PLS 211 Herbaceous Landscape Plants 
- PLS 212 Woody Landscape Plants 

One of the following five courses:
- PLS 201 Botany I 
- PLS 203 Botany II 
- PLS 204 Introduction to Soil Science 
- PLS 205 Introduction to Soil Science Lab 
- PLS 211 Herbaceous Landscape Plants 

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63) 

DEGREE: BACHELOR OF SCIENCE
MAJOR: PLANT BIOLOGY

CREDITS
MAJOR REQUIREMENTS

Three credits in an approved course or courses stressing multi-cultural, ethnic, and/or gender-related course content (see p. 60-63).

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

DEGREE: BACHELOR OF SCIENCE
MAJOR: PLANT SCIENCE

CREDENTIALS TO TOTAL A MINIMUM OF .................................. 124

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
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 306 Introduction to Plant Molecular Biology 3
PLSC 410 Introduction to Plant Physiology 3
PLSC 435 Plant Development Biology 3
FREC 408 Research Methods 3
ENWC 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 credit may be counted toward the degree.

Suggested courses include:

PHYS 201 or higher Introductory Physics
CHEM 220/221 Quantitative Analysis

CREDENTIALS TO TOTAL A MINIMUM OF .................................. 124

AGRICULTURE AND NATURAL RESOURCES UNDERGRADUATE

Agricultural and Biological Sciences 9-12

Minimum of one course in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Engineering Technology, Animal Science, Food Science, Entomology and Wildlife Ecology, or Biology

Literature and Arts 6

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

Social Sciences and Humanities 9

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

Professional Studies

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

One of the following:

PHYS 201 Introduction to Physics
PHYS 203/204 Mechanics

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 credit may be counted toward the degree.

CREDENTIALS TO TOTAL A MINIMUM OF .................................. 124

THE ASSOCIATE IN SCIENCE DEGREE

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

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

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