COLLEGE OF AGRICULTURAL SCIENCES

The agricultural sciences blend business, science and technology to solve problems related to environmental protection; food and fiber production; and animal and plant health. Comprising nearly 25% of the nation's workforce, the agricultural sciences provide career opportunities in research, industry, education and government.

The curricula in the College of Agricultural Sciences provide the 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 counsultation with a faculty adviser helps the student make steady progress toward achieving these educational goals.

Majors are offered in food and agribusiness management, agricultural economics, agricultural education, bioresources engineering technology, animal science, engineering technology, natural resource management, entomology, environmental soil science, food science, entomology/plant pathology, plant science, landscape horticulture, plant biology, and general agriculture. Concentrations are available in wildlife conservation, general entomology, preveterinary medicine, agricultural biotechnology, applied animal science, general animal science, production and management, resource economics and rural development, and food marketing. Students interested in engineering technology or general agriculture may complete their degree requirements on the Newark campus or through the Parallel Program at Dover or Georgetown.

College faculty foster 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 agricultural sciences.

DEAN'S SCHOLAR PROGRAM

Each year, the College of Agricultural Sciences allows highly motivated 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.

AGRICULTURAL EDUCATION

This program qualifies the individual for certification by the State Department of Public Instruction as a comprehensive agricultural education instructor. Some students find it desirable to major in a particular area of agricultural sciences and include agricultural education courses in their bachelor's program, while others elect to double major.

A degree in agricultural education qualifies the graduate to serve as a teacher of agricultural education in public or private secondary schools, as an instructor of adult classes in agriculture, or as an educational leader with state or federal agencies or private businesses. Other opportunities can be found in educational administrative positions, production agriculture, the Cooperative Extension Service, the Natural Resources Conservation Service, and various leadership positions in agricultural organizations and agencies. Those who continue agricultural education studies through graduate school may go into college teaching, research, or government.

The curriculum in agricultural education is arranged individually with the liaison professor in agricultural education. Selected information in the section of this catalog on the College of Human Resources, Education and Public Policy may be helpful to the agricultural education major.

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: AGRICULTURAL EDUCATION

CURRICULUM	CREDITS
UNIVERSITY REQUIREMENTS	
ENGL 110 Critical Reading and Writing (with minimum grade of C-)	3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p 20)	3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

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

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Animal & Food Sciences, Bioresources Engineering, Food and Resource Economics, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology.

Literature and Arts 9

Nine credits from English and/or Communication.

Social Sciences and Humanities 9

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

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
GEOL 105 and 106
SCEN 101 and 102

MAJOR REQUIREMENTS

External to the College

EDST 201	Education in a Multicultural Society	3
EDST 230	Introduction to Exceptional Children	3
EDST 304	Educational Psychology – Social Aspects	3
EDST 305	Educational Psychology – Cognitive Aspects	3
EDDV 400	Student Teaching	6

The Agricultural Education program requires a 2.5 minimum overall G.P.A. for enrollment in EDDV 400, Student Teaching, a course required for the degree. The teacher education program adviser (see list on p. 155) should be consulted for other policies concerning qualifications for student teaching.

Within the College

A 2.75 index in at least thirty credits of technical agriculture from at least three departments in the college 30

Within the Department

Professional Education

AGED 380	Agricultural Education Materials and Approaches I	3
AGED 381	Agricultural Education Materials and Approaches II	3

ELECTIVES

Electives 32-35

May include Military Science, Music, or Physical Education. (Only four credits of activity-type Physical Education and/or four credits of performing Music organization credit may be counted toward the degree.)

In order to graduate with a major in Agricultural Education, students must have a minimum of 40 credit hours of General Education.

CREDITS TO TOTAL A MINIMUM OF 130

ANIMAL AND FOOD SCIENCES

The Department of Animal and Food Sciences offers undergraduate major and minor programs in Animal Science and in Food Science.

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 preveterinary training required for admission to veterinary school. The preveterinary concentration is designed to meet not only the department, college, and University requirements for the B.S. degree, but also the admission requirements of most 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.

The Food Science major is designed to provide students with a broad understanding and professional preparation in areas of food production, processing, evaluation, and distribution. These include positions within the food and allied industries, the government, and independent research institutions. The role of the food scientist in such positions may involve production and process development, engineering, quality control, technical service and sales, and regulatory service, education, or basic research. The food science research program has opportunities for students in three areas: (1) packaging, package product interaction, and food chemistry; (2) biotechnology, fermentations, and food microbiology; and (3) process engineering technology. Educational and research opportunities in biotechnology are fostered by the department's Biotechnology Group. The program includes course work in life and chemical sciences, mathematics and engineering, plus independent research work on applied science problems.

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

CURRICULUM — CREDITS

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (with minimum grade of C-) 3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 20) 3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

Mathematics course (MATH 115 or higher level) 3
Computer Science course (FREC 135, or equivalent) 3

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Food and Resources Economics, Food Science, Bioresources Engineering, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology.

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

Social Sciences and Humanities 9

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

Physical Sciences 8

Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science.

MAJOR REQUIREMENTS

External to the College

BISC 207	Introductory Biology I	4
BISC 208	Introductory Biology II	4
CHEM 101	General Chemistry	4
or		
CHEM 103	General Chemistry	4
CHEM 102	General Chemistry	4
or		
CHEM 104	General Chemistry	4

Within the Department

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

One course must be selected from the following:

ANSC 404	Dairy Production	3
ANSC 417	Beef Cattle and Sheep Production	4
ANSC 418	Swine Production	4
ANSC 421	Poultry Production	4
Animal Science courses		5

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.

ELECTIVES

Electives 58-61

May include Military Science, Music, or Physical Education. (Only four credits of activity-type Physical Education and/or four credits of performing Music organization credit may be counted toward the degree.) ANSC 399 may be taken one time for a maximum of 2 credits toward graduation.

Recommended Electives

FREC 201	Records and Accounts	3
ANSC 270	Biotechnology: Science and Socioeconomic Issues	3
ANSC 399	Teaching Assistant	1-2
ANSC 420	Equine Management	3
BISC 371	Introduction to Microbiology	4
COMM 350	Public Speaking	3
ENGL 312	Written Communications in Business	3

CREDITS TO TOTAL A MINIMUM OF 130

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: ANIMAL SCIENCE
CONCENTRATION: PREVETERINARY MEDICINE

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

Within the Concentration

ANSC 310	Animal Genetics Laboratory	1
BISC 371	Introduction to Microbiology	4
CHEM 321	Organic Chemistry	4
CHEM 322	Organic Chemistry	4
CHEM 527	Introductory Biochemistry	3
	or	
CHEM 641/642	Biochemistry	6
MATH 221	Calculus	3
PHYS 201	Introductory Physics I	4
PHYS 202	Introductory Physics II	4

ELECTIVES

Electives 30-33

May include Military Science, Music, or Physical Education. (Only four credits of activity-type Physical Education and/or four credits of performing Music organization credit may be counted toward the degree.) ANSC 399 may be taken one time for a maximum of 2 credits toward graduation.

Recommended Electives

FREC 201	Records and Accounts	3
ANSC 270	Biotechnology: Science and Socioeconomic Issues	3
ANSC 399	Teaching Assistant	1-2
ANSC 431	Infection and Immunity in Animal Diseases	4
ANSC 635	Introduction to Virology	3
COMM 312	Oral Communication in Business	3
ENGL 312	Written Communications in Business	3
FREC 408	Research Methods	3

CREDITS TO TOTAL A MINIMUM OF 130

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: ANIMAL SCIENCE
CONCENTRATION: AGRICULTURAL BIOTECHNOLOGY

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

Within the Concentration

ANSC 270	Biotechnology: Science and Socioeconomic Issues	3
ANSC 310	Animal Genetics Laboratory	1
ANSC 466	Independent Study (Approved research project)	3
ANSC 570	Molecular Genetics	3
BISC 301	Molecular Biology of the Cell	4
BISC 371	Introduction to Microbiology	4
CHEM 321	Organic Chemistry	4
CHEM 322	Organic Chemistry	4
CHEM 527	Introductory Biochemistry	3
	or	
CHEM 214/216	Elementary Biochemistry	4
	or	
CHEM 641/642	Biochemistry	6
MATH 221	Calculus I	3
PHYS 201	Introductory Physics I	4
PHYS 202	Introductory Physics II	4
Select one 600-level course from ANSC or Biology (see recommended electives)		3-4

ELECTIVES

Electives 2-7

May include Military Science, Music, or Physical Education. (Only four credits of activity-type Physical Education and/or four credits of performing Music organization credit may be counted toward the degree.) ANSC 399 may be taken one time for a maximum of 2 credits toward graduation.

Recommended Electives

ANSC 399	Teaching Assistant	1-2
ANSC 431	Infection and Immunity in Animal Diseases	4
ANSC 624	IMonogastric Nutrition	3
ANSC 633	Poultry Pathology	3
ANSC 635	Introduction to Virology	3
ANSC 643	Molecular Endocrinology	4
ANSC 645	Avian Physiology	4
ANSC 654	Ruminant Nutrition	3
BISC 601	Immunochemistry	3
BISC 602	Molecular Biology of the Cell	3
BISC 650	Bacterial Physiology	3
BISC 653	Recent Advances in Molecular Biology	3
BISC 654	Biochemical Genetics	3
BISC 658	Developmental Genetics	3
BISC 671	Immunobiology	3
BISC 679	Virology	3
BISC 693	Human Genetics	3
CHEM 220	Quantitative Analysis	3
CHEM 418	Introductory Physical Chemistry	3
COMM 350	Public Speaking	3
ENGL 312	Written Communication in Business	3
FOSC 439/639	Food Microbiology	4
FOSC 449/649	Fermentation Technology	4

CREDITS TO TOTAL A MINIMUM OF 130

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
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 201	Behavior of Domestic Animals	3
ANSC 441	Reproductive Physiology	3
CHEM 213	Elementary Organic Chemistry	4
CHEM 214	Elementary Biochemistry	3
CHEM 216	Elementary Biochemistry Laboratory	1
ENTO 205	Elements of Entomology	3
FREC 150	Economics of Agriculture and Natural Resources	3
FREC 201	Records and Accounts	3
PLSC 151	Introduction to Crop Science	3
PLSC 204	Introduction to Soil Science	3

Select a minimum of two courses from the following:

ANSC 404	Dairy Production	3
ANSC 417	Beef Cattle and Sheep Production	4
ANSC 418	Swine Production	4
ANSC 421	Poultry Production	4

ELECTIVES

Electives 21-24

May include Military Science, Music, or Physical Education. (Only four credits of activity-type Physical Education and/or four credits of performing Music organization credit may be counted toward the degree.) ANSC 399 may be taken one time for a maximum of 2 credits toward graduation.

Recommended Electives

ANSC 270	Biotechnology: Science and Socioeconomic Issues	3
ANSC 399	Teaching Assistant	1-2
ANSC 420	Equine Management	4
ANSC 431	Infection and Immunity in Animal Diseases	4
BISC 371	Introduction to Microbiology	4
COMM 312	Oral Communication in Business	3
ENGL 312	Written Communications in Business	3
EGTE 328	Agricultural Waste Management Systems	3
FREC 153	Agricultural Salesmanship	3
FREC 350	Farm Management	3
PLSC 401	Agronomic Crop Science	3

CREDITS TO TOTAL A MINIMUM OF 130

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.

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE MAJOR: 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 content (see p. 20)		3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

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

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics, Bioresources Engineering, Animal Science, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology.

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

Social Sciences and Humanities 9

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

Physical Sciences 8

Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science.

MAJOR REQUIREMENTS

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

External to the College

CHEM 103	General Chemistry	4
CHEM 104	General Chemistry	4
CHEM 214	Elementary Biochemistry	3
CHEM 220	Quantitative Analysis I	3
CHEM 221	Quantitative Analysis Laboratory	1
PHYS 201	Introductory Physics I	4
PHYS 202	Introductory Physics II	4
BISC 207	Introductory Biology I	4
BISC 208	Introductory Biology II	4
BISC 371	Introduction to Microbiology	4
CHEM 321	Organic Chemistry	4
CHEM 322	Organic Chemistry	4
CHEM 418	Introductory Physical Chemistry	3
CHEM 419	Introductory Physical Chemistry	3
or		
CHEM 527	Introductory Biochemistry	3
CHEM 445	Physical Chemistry Laboratory	1
NTDT 200	Nutrition Concepts	3
ECON 151	Introduction to Microeconomics: Prices and Markets	3
PSYC 201	General Psychology	3
MATH 221	Calculus I	3
or		
MATH 241	Analytic Geometry and Calculus A	4
MATH 222	Calculus II	3
or		
MATH 242	Analytic Geometry and Calculus B	4

Within the College

FREC 135	Introduction to Data Analysis	3
FREC 408	Research Methods	3

Within the Department

A minimum grade of C must be achieved for credits to count toward the fulfillment of 36 credits in FS; 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 265	Seminar: Food Science	2
FOSC 359	Topics in Food Science	1
FOSC 365	Seminar: Food Science	1
FOSC 409	Food Processing I	4
FOSC 410	Food Processing II	4
FOSC 428	Food Chemistry	4
FOSC 429	Food Analysis	4
FOSC 439	Food Microbiology	4
FOSC 445	Food Engineering Technology	4
FOSC 446	Food Processing Engineering Technology	4
FOSC 449	Food Biotechnology	4

ELECTIVES

Electives 2-4

May include Military Science, Music, or Physical Education. (Only two credits of activity-type Physical Education and four credits of Music organization credits and four credits of 100- and 200-level courses in Military Science/Air Force may be counted toward the degree.) FOSC 399, Teaching Assistant, may be taken one time allowing a maximum of 2 credits toward graduation.

CREDITS TO TOTAL A MINIMUM OF 132

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. A C grade or 2.00 or higher is required in all FOSC courses for the minor in Food Science. The minor in Food Science requires a minimum of 15 food science credits. Required FOSC 305/306 (3), and any 3 other FOSC courses.
3. Successful completion of mathematics courses is required prior to taking food science courses for the minor.

   MATH 221 Calculus I (3) and
   MATH 222 Calculus II (3)

Number of credits required: 15

FOSC 305/306	Food Science & Laboratory	3

Select any 3 courses (12 credits) from:

FOSC 409	Food Processing I	4
FOSC 410	Food Processing II	4
FOSC 428	Food Chemistry	4
FOSC 429	Food Analysis	4
FOSC 439	Food Microbiology	4
FOSC 445	Food Engineering Technology	4
FOSC 446	Food Process Engineering Technology I	4
FOSC 449	Food Biotechnology	4

Prerequisities 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 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 Agricultural Sciences and other colleges of the University. To graduate with a major in bioresources engineering technology, students must attain a 2.0 average in bioresources engineering technology courses. This is in addition to the University requirement for graduation that a 2.0 average be attained in all course work at 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.

DEGREE: BACHELOR OF APPLIED SCIENCE
MAJOR: BIORESOURCES ENGINEERING TECHNOLOGY

CURRICULUM — CREDITS

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. 20) ... 3

COLLEGE REQUIREMENTS

Communications ... 7

Seven credits selected to provide training in oral and written communications to include:

EGTE 365 Junior Seminar ... 1

A second writing course selected from the following:

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

An oral communications course selected from the following:

AGRI 212 Oral Communications in Agriculture and Natural Resources ... 3
COMM 200 Introduction to Human Communication Systems ... 3
COMM 255 Fundamentals of Communication ... 3
COMM 312 Oral Communication in Business ... 3
COMM 350 Public Speaking ... 3
COMM 356 Small Group Communication ... 3

Social Sciences and Humanities ... 15

Fifteen credits selected to provide an appreciation and understanding of our cultural heritage, interpersonal relationships, interrelationships between technology and society and a value system for sound decision making to include:

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

The remaining nine credits to be selected from a minimum of three of the following areas: Anthropology, Art, Art History, Black American Studies, Criminal Justice, Economics, Education, English, Foreign Language, Geography, History, Music, Philosophy, Political Science, Psychology, Sociology, Theatre, or Women's Studies.

Basic Sciences and Mathematics ... 35

A minimum of 35 credits selected to provide fundamental knowledge about nature and its phenomena. Specific requirements are:

Biology, Chemistry and Physics

Select one of the following Biology/Life Sciences options:

BISC 207 Introductory Biology I ... 4
and BISC 208 Introductory Biology II ... 4
or
BISC 103 General Biology ... 3
and BISC 113 General Biology Laboratory ... 1
ENTO 201 Wildlife Conservation and Ecology ... 3
or
PLSC 101 Botany I ... 4
and ENTO 201 Wildlife Conservation and Ecology ... 3

Required:

CHEM 103 General Chemistry ... 4
CHEM 104 General Chemistry ... 4
PHYS 207 Fundamentals of Physics I ... 4
PHYS 208 Fundamentals of Physics II ... 4

Mathematics

MATH 241 Analytic Geometry and Calculus A ... 4
MATH 242 Analytic Geometry and Calculus B ... 4
MATH 243 Analytic Geometry and Calculus C ... 4

MAJOR REQUIREMENTS

Technical Sciences ... 18

Eighteen credits that deal with the application of engineering science subject matter to include one course in each of the following areas: Electricity, Fluid Mechanics, Statics, and Thermodynamics.

Specific requirements are:

EGTE 218 Fundamentals of Hydraulic Systems ... 4
EGTE 244 Electricity for Engineering Technology ... 4
EGTE 311 Fundamentals of Thermodynamics ... 3
EGTE 354 Rural/Light Industrial Buildings ... 4

The remaining three credits must be selected from one of the following areas: Dynamics, Electronics, Materials Technology, or Strength of Materials. EGTE courses that satisfy this requirement are:

EGTE 344 Electronics and Microprocessors ... 3
EGTE 435 Machinery Design and Development ... 3

Technical Skills ... 13

Thirteen credits to provide skills and knowledge of appropriate methods, procedures and techniques, to include:

Required:

EGTE 111 Computer Applications in Engineering Technology ... 3
EGTE 113 Land Surveying ... 2
EGTE 125 Intro. to Bioresources Engineering Tech ... 2
EGTE 209 Computer Aided Drafting ... 3
EGTE 443 Instrumentation ... 3

Technical Specialization ... 21

Twenty-one credits selected from courses that involve technical analysis and design.

Specific requirements are:

EGTE 321 Storm-Water Management ... 4
EGTE 328 Waste Management Systems ... 3
EGTE 421 Bioresources Management Systems ... 4
EGTE 431 Mechanical Aspects of Biological and Natural Resources ... 4
EGTE 451 Senior Design ... 3

and one of the following:

BREG 628 Land Application of Wastes ... 3
EGTE 331 Mechanical Power Units ... 4
EGTE 440 Plant Layout and Materials Handling ... 3
EGTE 444 Programmable Logic Control Systems ... 3
EGTE 445 Food Engineering Technology ... 4
EGTE 456 Fundamentals of HVAC ... 3

Technical Support ... 18

Eighteen credits selected to support the specialization and career interests of the student.

Specific Requirements:

PLSC 204 Introduction to Soil Science ... 4
A minimum of three credits in biology/life sciences or natural resources, excluding courses used to satisfy the Biology, Chemistry, and Physics group ... 3

The remaining credits may be satisfied by additional courses in the Bioresources Engineering Department or related courses approved by the student's advisor.

To graduate with a major in Bioresources Engineering Technology, the students must attain an average 2.0 index in all courses with a AGEG (BREG) or EGTE prefix.

ELECTIVES

Electives 1-2

After required courses, sufficient elective credits must be taken to meet the minimum number of 130 credits. May include Military Science, Music, or Physical Education. (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

ENGINEERING TECHNOLOGY

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

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

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

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

DEGREE: BACHELOR OF APPLIED SCIENCE
MAJOR: ENGINEERING TECHNOLOGY

CORE CURRICULUM — CREDITS

UNIVERSITY REQUIREMENTS

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

Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 20) 3

COLLEGE REQUIREMENTS

Communications 6

Six credits selected to provide training in oral and written communications to include:

A second writing course selected from the following:

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

An oral communications course selected from the following:

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

Social Sciences and Humanities 15

Fifteen credits selected to provide an appreciation and understanding of our cultural heritage, interpersonal relationships, interrelationships between technology and society and a value system for sound decision making to include:

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

An additional nine credits to be selected from a minimum of three of the following areas: Anthropology, Art, Art History, Black American Studies, Criminal Justice, Economics, Education, English, Foreign Language, Geography, History, Music, Philosophy, Political Science, Psychology, Sociology, Theatre or Women's Studies.

Basic Sciences and Mathematics 31

Thirty-one credits selected to provide fundamental knowledge about nature and its phenomena and mathematics including calculus as follows:

Biology, Chemistry and Physics

Biology/Life Science course 3
CHEM 103 General Chemistry 4
CHEM 104 General Chemistry 4
PHYS 201 Introductory Physics I 4
or
PHYS 207 Fundamentals of Physics I 4
PHYS 202 Introductory Physics II 4
or
PHYS 208 Fundamentals of Physics II 4

Mathematics and Statistics

A minimum of 12 credits in mathematics and statistics. Specific requirements are:

MATH 221 Calculus I 3
or
MATH 241 Analytic Geometry and Calculus A 4
MATH 222 Calculus II 3
or
MATH 242 Analytic Geometry and Calculus B 4
STAT 201 Introduction to Statistics I 3
or
MATH 243 Analytic Geometry and Calculus C 4
Elective Mathematics or Statistics course at the 200-level or above 3

MAJOR REQUIREMENTS

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

Technical Sciences 18

Eighteen credits that deal with the application of engineering science subject matter.

Specific requirements are:

EGTE 218 Fundamentals of Hydraulic Systems 4
EGTE 244 Electricity for Engineering Technology 4
EGTE 311 Fundamentals for Thermodynamics 3
EGTE 454 Rural/Light Industrial Buildings 4

In addition, a course must be selected from one of the following areas: Dynamics, Electronics, Material Technology or Strength of Materials.

In addition to completing the requirements of the core curriculum in Engineering Technology, students must complete the requirements for a concentration in Technical Applications or a concentration in Technical Management.

CONCENTRATION: TECHNICAL APPLICATIONS

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

Technical Skills 12-30

A minimum of fourteen credits selected to provide skills and knowledge of appropriate methods, procedures and techniques and may include computer use, graphics, problem solving, processes, construction techniques, instrumentation techniques, production methods, field operations, plant operations, safety and maintenance to include:

EGTE 109 Technical Drafting 2
EGTE 111 Computer Application in Engineering Technology 3
EGTE 209 Computer Aided Drafting 3

Microcomputer course (EGTE 112 Personal Computers and Technology preferred) ... 3
Instrumentation or microprocessor course ... 3

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

Technical Specialization ... 15-17

A minimum of fifteen credits selected from courses that involve technical design and electives. At least one course (this cannot be satisfied by transfer credit) that emphasizes use of the computer as a problem solving tool will be required and will be selected from:

EGTE 321 Storm Water Management ... 4
EGTE 331 Mechanical Power Units ... 4
EGTE 435 Machinery Design and Development ... 3
EGTE 456 Fundamentals of HVAC ... 3

Four of the following courses must be selected:

EGTE 321 Storm Water Management ... 4
EGTE 331 Mechanical Power Units ... 4
EGTE 344 Electronics and Microprocessors ... 3
EGTE 435 Machinery Design and Development ... 3
EGTE 440 Plant Layout and Materials Handling ... 3
EGTE 443 Instrumentation ... 3
EGTE 444 Programmable Logic Control Systems ... 3
EGTE 445 Food Engineering Technology ... 4
EGTE 456 Fundamentals of HVAC ... 3

Technical Support ... 19

Nineteen credits selected to support the specialization and career interests of the student.

ELECTIVES

After required courses, sufficient elective credits must be taken to meet the minimum number of 130 credits. May include Military Science, Music, or Physical Education. (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

CONCENTRATION: TECHNICAL MANAGEMENT

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

Technical Skills ... 14-30

A minimum of fourteen credits selected to provide skills and knowledge of appropriate methods, procedures and techniques and may include computer use, graphics, problem solving, processes, construction techniques, instrumentation methods, production methods, field operations, plant operations, safety and maintenance to include:

EGTE 109 Technical Drafting ... 2
EGTE 111 Computer Application in Engineering Technology ... 3
EGTE 209 Computer Aided Drafting ... 3
Microcomputer course
(EGTE 112 Personal Computers and Technology preferred) ... 3
Instrumentation or microprocessor course ... 3

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

Technical Specialization ... 9-16

A minimum of nine credits selected from courses that involve technical design and electives. At least one course (this requirement cannot be satisfied by transfer credit) that emphasizes use of the computer as a problem solving tool will be required and will be selected from:

EGTE 321 Storm Water Management ... 4
EGTE 331 Mechanical Power Unit ... 4
EGTE 435 Machinery Design and Development ... 3
EGTE 456 Fundamentals of HVAC ... 3

Technical Management ... 15

A minimum of fifteen credits selected to enhance the ability to understand the operation and management of companies and/or their production units to include:

FREC 201 Records and Accounts ... 3
or
ACCT 207 Accounting I ... 3

Accounting credits cannot exceed six of the fifteen crdit 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, sufficient elective credits must be taken to meet the minimum number of 130 credits. May include Military Science, Music, or Physical Education. (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 completion of a minimum of 20 credits of engineering technology courses in accordance with the requirements listed here. All students must meet the required prerequisites for any engineering technology course before it is taken. Before being admitted to the minor, the student must have successfully 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 below.

The required engineering technology courses are:
EGTE 109 Technical Drafting ... 2
EGTE 111 Computer Applications in Engineering Technology ... 3

An additional 15 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, 113, 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 species.

The Department offers two concentrations in the major. Students can focus their biological interest on insects in the *General Entomology Concentration.* This program requires basic sciences as well as specialty courses on insects. Some flexibility in course selection permits students to emphasize pest management or insect biology. The *Wildlife Conservation Concentration* 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. The department also co-offers Natural Resource Management and Entomology/Plant Pathology, 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.

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: ENTOMOLOGY
CONCENTRATION: GENERAL ENTOMOLOGY

CURRICULUM	CREDITS
UNIVERSITY REQUIREMENTS	
ENGL 110 Critical Reading and Writing (with minimum grade of C-)	3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 20)	3
COLLEGE REQUIREMENTS	
Mathematics and Computer Science	
Mathematics course (MATH 115, 171 or higher level)	3
Computer Science course (FREC 135, or equivalent)	3
Agricultural and Biological Sciences	9-12
Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Bioresources Engineering, Animal Science (except ANSC 300), Plant and Soil Sciences (except PLSC 300), or Biology	
Literature and Arts	6
Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language	
Social Sciences and Humanities	9
Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, or Women's Studies	
Physical Sciences	8
Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science	
MAJOR REQUIREMENTS	
A minimum grade of C- is required for all ENTO credits used to satisfy departmental requirements. Except as noted, a course may be applied toward both a major requirement and a college requirement.	
External to the College	
BISC 207 Introductory Biology I	4
BISC 208 Introductory Biology II	4
BISC 302 General Ecology	3
CHEM 101/102 General Chemistry	8
or	
CHEM 103/104 General Chemistry	8
Within the Department	
ENTO 205 Elements of Entomology	3
ENTO 305 Entomology Laboratory	2
ENTO 406 Insect Identification—Taxonomy	3
ENTO 465 Seminar	1
Within the Concentration	
ENTO 300 Principles of Animal and Plant Genetics	3
ENTO 405 Insect Structure and Function	4
ENTO 408 Field Taxonomy	2
ENTO courses (may include 3 credits maximum of Independent Study, Research, and Field Experience)	6
Nine credits from the following:	9
BISC XXX Any biology course at or above 300-level	
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	
Electives	30
Organic Chemistry, Biochemistry, Statistics, Physics, and additional writing courses are strongly recommended. (Only two credits of activity-type Physical Education and performing Music organization may be counted toward the degree.)	
CREDITS TO TOTAL A MINIMUM OF	**124**

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: ENTOMOLOGY
CONCENTRATION: WILDLIFE CONSERVATION

CURRICULUM	CREDITS
UNIVERSITY REQUIREMENTS	
ENGL 110 Critical Reading and Writing (with minimum grade of C-)	3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 20)	3
COLLEGE REQUIREMENTS	
Mathematics and Computer Science	
Mathematics course (MATH 115, 171 or higher level)	3
Computer Science course (FREC 135, or equivalent)	3
Agricultural and Biological Sciences	9-12
Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Agricultural Engineering, Animal Science (except ANSC 300), Plant and Soil Sciences (except PLSC 300), or Biology	
Literature and Arts	6
Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language	
Social Sciences and Humanities	9
Minimum of one course in three of the following areas: Anthropology, Black American Studies, Criminal Justice, Economics, Education, Geography, History, Philosophy, Political Science, Psychology, Sociology, or Women's Studies	
Physical Sciences	8
Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science	
MAJOR REQUIREMENTS	
A minimum grade of C- is required for all ENTO credits used to satisfy departmental requirements. Except as noted, a course may be applied toward both a major requirement and a college requirement.	
External to the College	
BISC 207 Introductory Biology I	4
BISC 208 Introductory Biology II	4
BISC 302 General Ecology	3
CHEM 101/102 General Chemistry	8
or	
CHEM 103/104 General Chemistry	8
Within the Department	
ENTO 205 Elements of Entomology	3
ENTO 305 Entomology Laboratory	2
ENTO 406 Insect Identification—Taxonomy	3
ENTO 465 Seminar	1
Within the Concentration	
ENTO 201 Wildlife Conservation and Ecology	3
ENTO 325 Wildlife Management	3
ENTO 318 Taxonomy of Birds	2
ENTO 418 Avian Biology	2
ENTO 425 Mammalogy	3
ENTO courses (may include 3 credits maximum of Independent Study, Research, and Field Experience)	5
GROUP I: 7-8 credits from the following (or higher levels of CHEM and PHYS):	
CHEM 213 Elementary Organic Chemistry	4
CHEM 214 Elementary Biochemistry	3
CHEM 216 Elementary Biochemistry Laboratory	1
GEOG 206 Physical Geography: Topography-Soils	3
GEOL 107 General Geology	4
PHYS 201 Introductory Physics I	4
PHYS 202 Introductory Physics II	4
PLSC 204 Introduction to Soil Science	4
GROUP II: 7-8 credits from the following:	
ANSC 140 Functional Anatomy of Domestic Animals	4
BISC 301 Molecular Biology of the Cell	4

BISC 303	Genetic and Evolutionary Biology	4
BISC 305	Cell Physiology	4
BISC 306	General Physiology	4
BISC 312	General Ecology Lab	1
BISC 324	Invertebrate Zoology	4
BISC 371	Introduction to Microbiology	4
BISC 442	Vertebrate Morphology	4
BISC 495	Evolution	3
BISC 480	Vertebrate Natural History	4
BISC 637	Population Ecology	3
ENTO 300	Principles of Animal and Plant Genetics	3
ENTO 310	Animal and Plant Genetics Laboratory	1

(same as PLSC 300, 310; may not count for both Group II and III)

GROUP III: 7-8 credits from the following:

PLSC 101	Botany I	4
PLSC 201	Botany II	4
PLSC 212	Woody Landscape Plants	4
PLSC 300	Principles of Animal and Plant Genetics	3
PLSC 306	Plant Molecular Biology	3
PLSC 310	Animal and Plant Genetics Lab	1

(same as ENTO 300, 310; may not count for both Group II and III)

PLSC 402	Plant Taxonomy	3
PLSC 410	Introduction to Plant Physiology	3
PLSC 420	Plant Physiology Laboratory	2

GROUP IV: 6 credits from the following:

Only 3 credits may count toward the College Literature and Arts Group Requirement.

AGRI 212	Oral Communication in Agriculture and Natural Resources	3
COMM 255	Fundamentals of Communication	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
THEA 102	Introduction to Performance	3
THEA 204	Introduction to Voice and Speech	3

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

EGTE 111	Computer Applications in Engineering Technology	3
or		
CISC 105	General Computer Science	3
or		
GEOG 250	Computer Methods in Geography	4
FREC 408	Research Methods I	3
FREC 409	Research Methods II	3
FREC 480	Geographic Information Systems in Natural Resources Management	4
MATH 221	Calculus I	3
MATH 222	Calculus II	3
MATH 230	Finite Mathematics with Applications	3
STAT 201	Introduction to Statistics I	3
STAT 202	Introduction to Statistics II	3

GROUP VI: 6 credits from the following:

ECON 151	Introduction to Microeconomics: Prices and Markets	3
or		
FREC 150	Economics of Agriculture and Natural Resources	3

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

FREC 424	Resource Economics	3
FREC 444	Economics of Environmental Management	3
FREC 450	Topics in Environmental Law	3
GEOG 235	Conservation of Natural Resources	3
GEOG 236	Conservation: Global Issues	3
PHIL 340	Cross-cultural Environmental Ethics	3
PHIL 448	Environmental Ethics	3
POSC 105	The American Political System	3
POSC 220	Introduction to Public Policy	3
POSC 350	Politics and the Environment	3
SOCI 210	Population Problems	3

ELECTIVES

Electives 6-26

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 organization may be counted toward the degree.)

CREDITS TO TOTAL A MINIMUM OF 124

REQUIREMENTS FOR A MINOR IN ENTOMOLOGY

The minor in entomology requires 15 credits of courses with an ENTO prefix, including: ENTO 205, 305, and 406. A student may emphasize general entomology or wildlife conservation by proper choice of ENTO courses for the remaining 7 credits. 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.

ENTOMOLOGY/PLANT PATHOLOGY

Because of mutual interests and problems in the field of plant protection, the Department of Entomology and Applied Ecology and the Department of Plant and Soil Sciences offer a joint major, entomology/plant pathology (EPP). In a world of expanding population and increasing pressure on supplies of food and fiber, both plant pathology and entomology offer the challenge and satisfaction of a career that contributes to human welfare. This combined major allows students to study both insects and plant diseases. It includes courses emphasizing recognition of pests and their symptoms and strategies for pest management compatible with agriculture and the environment.

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: ENTOMOLOGY/PLANT PATHOLOGY

CURRICULUM — CREDITS

UNIVERSITY REQUIREMENTS

ENGL 110	Critical Reading and Writing (with a minimum grade of C-)	3
	Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 20)	3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

	Mathematics course (MATH 115 or higher level)	3
	Computer Science course (FREC 135, or equivalent)	3

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics (except FREC 135), Food Science, Bioresources Engineering, Animal Science, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology.

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

Social Sciences and Humanities 9

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

Physical Sciences 8

Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science.

MAJOR REQUIREMENTS

External to the College

BISC 207	Introductory Biology I	4
BISC 208	Introductory Biology II	4
CHEM 101/102	General Chemistry	8
or		
CHEM 103/104	General Chemistry	8

Within the Departments

ENTO 205	Elements of Entomology	3
ENTO 305	Entomology Laboratory	2
ENTO 406	Insect Identification—Taxonomy	3
ENTO 408	Field Taxonomy	2
ENTO 411	Economic Entomology	3
ENTO 465	Seminar	1
PLSC 101	Botany I	4
PLSC 201	Botany II	4

PLSC 303 Introductory Plant Pathology 4
PLSC 411 Diagnostic Plant Pathology 3
Sixteen credits from Entomology and Applied Ecology and/or Plant Science (may include 3 credits maximum of Independent Study, Research and Field Experience) 16

ELECTIVES

Electives 26-29
Courses in Agriculture, Biology, and the Physical Sciences are recommended. (Only two credits of activity-type Physical Education and performing Music organization may be counted toward the degree.)

CREDITS TO TOTAL A MINIMUM OF 124

The choice of department in which to complete the remaining credits provides the student with the opportunity to emphasize either applied entomology or plant pathology in his or her program. Students should complete their programs with electives that will provide an education best suited to their goals. Course election should be made in consultation with the academic advisor during the preregistration period of each term. This program should include other courses in agriculture, biology, and physical sciences.

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.

Two major programs are offered: (a) food and agribusiness management and (b) agricultural economics. The curricula differ in the amount of emphasis given to agricultural production, business and economics. Both curricula qualify the student for graduate work. The department also co-offers Natural Resource Management, an interdiciplinary major.

The curriculum 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 curriculum in agricultural economics emphasizes resource and environmental economics, production economics 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. Two concentrations are offered as part of the agricultural economics major: production and management, and resource economics and rural development.

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: FOOD AND AND AGRIBUSINESS MANAGEMENT

CURRICULUM 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. 20) 3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

Mathematics course (MATH 115 or higher level; MATH 221, MATH 230, and STAT 201 are strongly recommended) 3
Computer Science course (FREC 135 or equivalent) 3
AGRI 165 Mastering the Freshman Year 1

Agricultural and Biological Sciences 9-12
Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics, Bioresources Engineering, Animal Science, Food Science, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology.

Literature and Arts 6
Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

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

Physical Sciences 8
Minimum of eight credits, selected from one of the following two-course sequences:
SCEN 101 and 102
GEOL 105 and 106
CHEM 101/102 or 103/104
PHYS 201/202 or 207/208

MAJOR REQUIREMENTS

External to the College

ACCT 207 Accounting I 3
ACCT 208 Accounting II 3
COMM 312 Oral Communication in Business 3
ENGL 312 Written Communications in Business 3
ECON 151 Introduction to Microeconomics: Prices and Markets 3
ECON 152 Introduction to Macroeconomics: National Economy 3
BUAD 301 Introduction to Marketing 3
Two additional courses offered by the College of Business and Economics at the 300 or 400 level 6
One foreign language course 4

Within the Department

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

Free Electives 24
May include Military Science, Music, or Physical Education. Only four credits of activity-type Physical Education and/or four credits of performing Music organization 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 312 Food Retailing and Product Management
FREC 335 Advanced Data Management
FREC 427 Agribusiness Financial Management
FREC 471 Futures and Options Markets
FREC 464 Agribusiness Internship

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

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

CREDITS TO TOTAL A MINIMUM OF 128

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

The requirements for the major of 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 312	Food Retailing and Product Management	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.

CREDITS TO TOTAL A MINIMUM OF 128

REQUIREMENTS FOR A MINOR IN FOOD AND AGRIBUSINESS MANAGEMENT

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

Marketing/Management Area:

FREC 345	Strategic Selling and Buyer Communication
FREC 404	Food and Fiber Marketing
FREC 405	Management and Leadership Development
FREC 471	Futures and Options Markets

Decision Analysis/International Trade Area:

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

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

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE MAJOR: AGRICULTURAL ECONOMICS

CURRICULUM CREDITS

UNIVERSITY REQUIREMENTS

ENGL 110 Critical Reading and Writing (with a minimum grade of C-) 3
Three credits in an approved course or courses stressing multicultural, ethnic, and/or gender-related content (see p. 20) 3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

Mathematics course (MATH 115 or higher level; MATH 221, MATH 230, and STAT 201 are strongly recommended) 3
Computer Science course (FREC 135 or equivalent) 3

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics, Food Science, Agricultural Engineering, Animal Science, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

Social Sciences and Humanities 9

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

Physical Sciences 8

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

MAJOR REQUIREMENTS

External to the College

COMM 312	Oral Communication in Business	3
ENGL 312	Written Communications in Business	3
ECON 151	Introduction to Microeconomics: Prices and Markets	3
ECON 152	Introduction to Macroeconomics: National Economy	3
ECON 302	Banking and Monetary Policy	3
ECON 300	Intermediate Microeconomic Theory	3
ECON 303	Intermediate Macroeconomic Theory	3
Two additional courses offered by the College of Business and Economics at the 300-level or higher.		6

Students can qualify for a minor in Economics if they take an additional 400-level Economics course and obtain a grade of C- or better in all Economics courses
(see "The Minor in Economics" in the College of Business and Economics curricula).

Within the Department

FREC 125	Elementary Agricultural Economics: Applications	1
FREC 135	Introduction to Data Analysis	3
FREC 150	Economics of Agriculture and Natural Resources	3
FREC 201	Records and Accounts	3
FREC 240	Quantitative Methods in Agricultural Economics	3
FREC 465	Seminar	1

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

1. Marketing/International Trade

FREC 404	Food and Fiber Marketing	3
FREC 410	International Agricultural Trade and Marketing	3
FREC 471	Futures and Options Markets	4

2. Production/Management

FREC 403	Production Economics	3
FREC 406	Agriculture and Natural Resource Policy	3
FREC 408	Research Methods I	3
FREC 427	Agribusiness Financial Management	3

3. Resources/Development

FREC 420	Agriculture in Economic Development	3
FREC 424	Resource Economics	3
FREC 429	Community Economic Development	3
FREC 444	Economics of Environmental Management	3

FREC 405, FREC 435, FREC 630, and Independent Study may not be counted in the seven courses.

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

Electives 29-33

May include Military Science, Music, or Physical Education. (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

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE MAJOR: AGRICULTURAL ECONOMICS CONCENTRATION: PRODUCTION AND MANAGEMENT

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

FREC 350	Farm Management	3
FREC 403	Production in Economics	3

Agricultural Economics (FREC) courses required for the Agricultural Economics major may be used to satisfy requirements for the Production and Management concentration.

In addition to the Business and Economic courses required for the Agricultural Economics major, the following courses must be taken:

BUAD 309	Management and Organizational Behavior	3
BUAD 382	International Business Management	3
ECON 415	Economic Forecasting	3
STAT 201	Introduction to Statistics I	3
STAT 202	Introduction to Statistics II	3

CREDITS TO TOTAL A MINIMUM OF 130

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: AGRICULTURAL ECONOMICS
CONCENTRATION: RESOURCE ECONOMICS AND RURAL DEVELOPMENT

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

FREC 424	Resource Economics–Theory and Policy	3
FREC 429	Rural Economics Development-Theory and Policy	3
FREC 444	Economics of Environmental Management	3

Agricultural Economics (FREC) courses required for the Agricultural Economics major may be used to satisfy requirements for the Resource Economics and Rural Development concentration.

One course in Geography 3

In addition to the Business and Economics courses required for the Agricultural Economics major, four of the following courses, with at least one in each area, must be taken:

1. Political Economy

ECON 306	Economic Theory of Politics	3
ECON 311	Economics of Developing Countries	3
ECON 408	Economics of Law	3
ECON 411	Economics of Growth and Development	3

2. Quantitative Methods

ECON 415	Economic Forecasting	3
ECON 422	Econometric Methods and Models I	3
ECON 423	Econometric Methods and Models II	3
ECON 426	Mathematical Economic Analysis	3

3. Applications

ECON 433	Economics of the Public Sector	3
ECON 475	Economics of Natural Resources	3
ECON 477	Benefit-Cost Analysis	3

CREDITS TO TOTAL A MINIMUM OF 130

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. The department also co-offers Natural Resource Management, an interdisciplinary major.

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: ENVIRONMENTAL SOIL SCIENCE

CURRICULUM — 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. 20)		3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

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

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics, Bioresources Engineering, Animal Science, Food Science, Entomology and Applied Ecology, or Biology.

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

Social Sciences and Humanities 9

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

Physical Sciences 8

Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science.

MAJOR REQUIREMENTS

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

External to the College

CHEM 101	General Chemistry	4
or		
CHEM 103	General Chemistry	4
CHEM 102	General Chemistry	4
or		
CHEM 104	General Chemistry	4
CHEM 213	Organic Chemistry	4
CHEM 220	Quantitative Analysis	3
CHEM 221	Quantitative Analysis Laboratory	1
ENGL 410	Technical Writing	3
GEOG 220	Meteorology	3
GEOL 107	General Geology I	4
MATH 221	Calculus I	3
PHYS 201	Introductory Physics I	4

Within the College

EGTE 103	Land and Water Management	2
EGTE 113	Land Surveying	2
EGTE 328	Agricultural Waste Management	3
FREC 150	Economics of Agriculture and Natural Resources	3

Within the Department

PLSC 101	Botany I	4
PLSC 151	Introduction to Crop Science	3
PLSC 204	Introduction to Soil Science	4
PLSC 303	Introductory Plant Pathology	4
PLSC 305	Environmental Soil Management	4
PLSC 401	Agronomic Crop Science	3
PLSC 608	Soil Chemistry	3
PLSC 619	Soil Microbiology	3

ELECTIVES

Electives 14-17

May include the following suggested courses or other electives.

BISC 321	Environmental Biology	3
FREC 135	Introduction to Data Analysis	3
FREC 444	Economics of Environmental Management	3
GEOG 235	Conservation of Natural Resources	3
GEOL 415	General Geomorphology	3
GEOL 428	Hydrogeology	3
GEOL 421	Environmental and Applied Geology	3
PLSC 603	Soil Physics	3
POSC 350	Politics and the Environment	3

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: LANDSCAPE HORTICULTURE

CURRICULUM — 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. 20)		3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

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

Agricultural and Biological Sciences 9-12

Minimum of one course in three of the following areas: Food and Resource Economics, Food Science, Agricultural Engineering, Animal Science, Entomology and Applied Ecology, or Biology.

Literature and Arts 6
Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

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

Physical Sciences 8
Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science

MAJOR REQUIREMENTS

External to the College **18**

CHEM 101	General Chemistry	4
or		
CHEM 103	General Chemistry	4
CHEM 102	General Chemistry	4
or		
CHEM 104	General Chemistry	4
CHEM 213	Organic Chemistry	4
One of the following Communication courses:		3
AGRI 212	Oral Communication in Agricultural Sciences	3
COMM 312	Oral Communication in Business	3
COMM 350	Public Speaking	3
ENGL 312	Written Communication in Business	3
ENGL 410	Technical Writing	3
One business-related course chosen from the following:		3
ACCT 207	Accounting	3
ACCT 352	Law and Social Issues in Business	3
CNST 200	Consumer Economics	3
CNST 242	Consumer Movement in Perspective	3
ECON 151	Introduction to Microeconomics	3
ECON 152	Introduction to Macroeconomics	3
FREC 201	Records and Accounts	3
FREC 302	Management of Agribusiness Firms	3
FREC 312	Food Retailing and Product Management	3
FREC 404	Food and Fiber Marketing	3
FREC 406	Agricultural and Natural Resource Policy	3
FREC 430	Est. and Managing a Food and Agribusiness Enterprise	3
PHIL 200	Business Ethics	3
PLSC 403	Nursery and Garden Center Management	3
POSC 220	Introduction to Public Policy	3
POSC 301	State and Local Government	3

Within the Department/College: **62**

EGTE 103	Land and Water Management	3
ENTO 205	Elements of Entomology	3
FREC 150	Economics of Agricultural and Natural Resources	3
PLSC 101	Botany I	4
PLSC 133	Ornamental Horticulture	3
PLSC 201	Botany II	4
PLSC 204	Introduction to Soil Science	4
PLSC 211	Herbaceous Landscape Plants	3
PLSC 212	Woody Landscape Plants	4
PLSC 213	Turf Establishment and Maintenance	4
PLSC 300	Principles of Animal and Plant Genetics	3
PLSC 303	Introductory Plant Pathology	4
PLSC 305	Environmental Soil Management	4
PLSC 332	Basic Landscape Design	4
PLSC 364	Ornamental Horticulture Internship	3
or		
PLSC 366	Independent Study	3
PLSC 410	Introduction to Plant Physiology	3
PLSC 455	Issues in Horticulture	3
PLSC 470	Weed Biology and Control	3

ELECTIVES

May include Military Science, Music or Physical Education. Only two credits of activity-type Physical Education and performing Music organization credit may be counted toward the degree

CREDITS TO TOTAL A MINIMUM OF **124**

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE MAJOR: PLANT BIOLOGY

CURRICULUM		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. 20)		3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

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

Agricultural and Biological Sciences 9-12
Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics, Food Science, Bioresources Engineering, Animal Science, Entomology and Applied Ecology, or Biology.

Literature and Arts 6
Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language.

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

Physical Sciences 8
Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science.

MAJOR REQUIREMENTS

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

External to the College

BISC 207	Introductory Biology I	4
BISC 371	Introduction to Microbiology	4
CHEM 101	General Chemistry	4
or		
CHEM 103	General Chemistry	4
CHEM 102	General Chemistry	4
or		
CHEM 104	General Chemistry	4
CHEM 213	Elementary Organic Chemistry	4
or		
CHEM 321/322	Organic Chemistry	8
One of the following:		
CHEM 214 and 216	Elementary Biochemistry and Lab	4
CHEM 527	Biochemistry	3
CHEM 641 and 642	Biochemistry	8
One of the following Communication courses:		
AGRI 212	Oral Communication in Ag Sciences	3
COMM 312	Oral Communication in Business	3
COMM 350	Public Speaking	3
ENGL 312	Written Communications in Business	3
ENGL 410	Technical Writing	3

Within the Department/College

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 (Consider PLSC cross/listing)	1
Other Life Science Courses		12

Minimum of four courses and 12 credits with at least six credits at the 400-level or above. See advisor for list of approved courses in various interest areas

ELECTIVES

Electives 14-23

May include Military Science, Music, or Physical Education. (Only two credits of activity-type Physical Education and/or two credits of performing Music organization credit may be counted toward the degree.)
Suggest courses include:

PHYS 201 or higher Introductory Physics 4
(Recommended for students interested in graduate school)
CHEM 220/221 Quantitative Analysis 4

CREDITS TO TOTAL A MINIMUM OF 124

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE MAJOR: PLANT SCIENCE

CURRICULUM — 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. 20) 3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

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

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics, Food Science, Bioresources Engineering, Animal Science, Food Science, Entomology and Applied Ecology, or Biology.

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language

Social Sciences and Humanities 9

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

Physical Sciences 8

Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology, or Physical Science

MAJOR REQUIREMENTS

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

External to the College

CHEM 101 General Chemistry 4
or
CHEM 103 General Chemistry 4
CHEM 102 General Chemistry 4
or
CHEM 104 General Chemistry 4
CHEM 213 Elementary Organic Chemistry 4

One of the following three courses:

PHYS 101 Introduction to Physics 4
GEOL 105 General Geology 4
CHEM 214 Elementary Biochemistry 3

Within the Department

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

Electives 46-50

May include Military Science, Music, or Physical Education. (Only two credits of activity-type Physical Education and/or two credits of performing Music organization credit may be counted toward the degree.) Elective credits will be reduced for students choosing one of the following three optional concentrations.

CREDITS TO TOTAL A MINIMUM OF 124

NATURAL RESOURCE MANAGEMENT

Natural Resource Management is an interdepartmental major administered by the Departments of Entomology and Applied Ecology, Food and Resource Economics, and Plant and Soil Sciences. The purpose of the major is to teach an understanding of the social, physical, economic, legal, and political problems of managing the use and perpetuation of natural resources in the 21st century, together with the skills and capabilities to address those problems in the public or private forums. It combines education in the basic and applied biological and physical sciences with the fundamentals of public policy formulation.

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

Interested students should contact Dr. Steven Hastings, 229 Townsend Hall (302-831-1318).

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE MAJOR: NATURAL RESOURCE MANAGEMENT

CURRICULUM — 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. 20) 3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

Mathematics Course 3
Computer Science Course (FREC 135, or equivalent) 3

Agricultural and Biological Sciences 9-12

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

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language

Social Sciences and Humanities 9

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

Physical Sciences 8

Minimum of eight credits selected from one of the following areas: Chemistry, Physics, Geology or Physical Science

MAJOR REQUIREMENTS

Courses taken to satisfy Major Requirements may be used to satisfy University and College Requirements.

External to and within the College

AGRI 165 Mastering the Freshman Year (or any equivalent Department freshman seminar) 1
BISC 207 Introductory Biology I 4
and
BISC 208 Introductory Biology II 4
or
PLSC 101 Botany I 4
CHEM 101 General Chemistry 4
or
CHEM 103 General Chemistry 4
CHEM 102 General Chemistry 4
or
CHEM 104 General Chemistry 4
ECON 151 Introduction to Microeconomics 3
ECON 152 Introduction to Microeconomics 3
ENTO 201 Wildlife Conservation and Ecology 3
MATH 221 Calculus I 3

MATH 222	Calculus II	3
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 (including a minimum of three credits in oral communications):
Any course satisfying the College of Arts and Science 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	3
FREC 345	Strategic Selling and Buyer Communication	3

UNIV 401/402 Senior Thesis (Any student successfully completing a Senior Thesis may count three credits toward the writing course requirement of this group) 3

GROUP II: Chemistry/Physics: 8 credits from the following:

CHEM 213	Elementary Organic Chemistry	4
CHEM 214	Elementary Biochemistry	3
CHEM 216	Elementary Biochemistry Laboratory	1
CHEM 220	Quantitative Analysis	3
CHEM 221	Quantitative Analysis Laboratory	1
CHEM 321	Organic Chemistry	4
CHEM 322	Organic Chemistry	4
PHYS 201	Introductory Physics I	4
PHYS 202	Introductory Physics II	4

GROUP III: Statistics: 6 credits from the following:

FREC 408	Research Methods	3
and		
FREC 409	Research Methods II	3
or		
STAT 201	Introduction to Statistics I	3
and		
STAT 202	Introduction to Statistics II	3

GROUP IV: Ecosystems: 6 credits from the following:

BISC 302	General Ecology	3
ENTO 325	Wildlife Management	3
ENTO/PLSC 440	Integrated Disease and Pest Management	3
GEOG 235	Conservation of Natural Resources	3
or		
GEOG 236	Conservation: Global Issues	3
or		
GEOG 230	Humans and Earth Ecosystem	3
PLSC 305	Environmental Soil Management	4

GROUP V: Plants and Animals: 6 credits from the following:

BISC 371	Introduction to Microbiology	4
ENTO 205	Elements of Entomology	3
ENTO 305	Entomology Laboratory	2
ENTO 406	Insect Identification - Taxonomy	3
ENTO 318	Taxonomy of Birds	2
ENTO 418	Avian Biology	2
ENTO 425	Mammology	3
ENTO 426	Aquatic Insects	3
PLSC 212	Woody Landscape Plants	4
PLSC 303	Introductory Plant Pathology	4
PLSC 402	Plant Taxonomy	3

GROUP VI: Land and Water Management: 6 credits from the following:

EGTE 103	Land and Water Management	3
EGTE 113	Land Surveying	2
EGTE 328	Waste Management Systems	3
GEOL 107	General Geology	4
GEOG 101	Physical Geography	3
GEOG 206	Physical Geography: Topography-Soils	3
GEOG 220	Meteorology	3
GEOG 320	Water and Society	3

GROUP VII: Natural Resource/Environmental Policy: 12 credits from the following (including a minimum of six credits in Food and Resource Economics):

ECON 306	Public Choice	3
ECON 332	Public Finance and Fiscal Policy	3
ECON 360	Government and Business	3
EGTE 416	Project Economics Analysis	3
FREC 406	Agriculture and Natural Resource Policy	3
FREC 429	Community Economic Development	3
FREC 450	Environmental Law and Policy	3
POSC 220	Introduction to Public Policy	3
POSC 350	Politics and the Environment	3

GROUP VIII: Ethics: 3 credits from the following:

PHIL 200	Business Ethics	3
PHIL 202	Contemporary Moral Problems	3
PHIL 203	Ethics	3
PHIL 340	Cross Cultural Environmental Economics	3
PHIL 448	Environmental Ethics	3

ELECTIVES

Electives

After required courses are completed, sufficient elective credits must be taken to meet the minimum credit requirement for the degree. Elective credits may include Military Science, Music or Physical Education (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

GENERAL AGRICULTURE

For the student with broad interests, the major in general agriculture is offered.

DEGREE: BACHELOR OF SCIENCE IN AGRICULTURE
MAJOR: GENERAL AGRICULTURE

CURRICULUM — 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 20)	3

COLLEGE REQUIREMENTS

Mathematics and Computer Science

	Mathematics course	3
	Computer Science course (FREC 135, or rquivalent)	3

Agricultural and Biological Sciences 9-12

Minimum of one course outside the student's major in three of the following areas: Food and Resource Economics, Food Science, Bioresources Engineering, Animal Science, Entomology and Applied Ecology, Plant and Soil Sciences, or Biology

Literature and Arts 6

Six credits selected from the general areas of English, Art, Art History, Communication, Music, Theatre, or Foreign Language

Social Sciences and Humanities 9

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

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
GEOL 105 and 106

External to the college

A minimum of one course in written communications chosen from the following:

ENGL 301	Expository Writing	3
ENGL 302	Advanced Composition	3
ENGL 312	Written Communications in Business	3
ENGL 410	Technical Writing	3

A minimum of one course in oral communications chosen from the following:

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

Within the college

Thirty additional credits from any of the following departments: 30
Food and Resource Economics, Bioresources Engineering, Agriculture, Animal Science, Entomology and Applied Ecology, Food Science, or Plant and Soil Sciences. (Fifteen of the 30 credits must be in agriculture

courses specifically required by other majors in the college.) 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

Electives 56-59

May include Military Science, Music, or Physical Education. (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**

PREVETERINARY INSTRUCTION

Students in the College of Agricultural Sciences who desire to prepare for entrance to a veterinary school should consult with the Department of Animal and Food Sciences. See curriculum in department listing.

THE ASSOCIATE IN SCIENCE DEGREE

A two-year Associate in Science (A.S.) degree is offered by the College of Agricultural Sciences. 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 term 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.

The flexibility of the curriculum allows students to select only those courses that they and their academic advisor deem most important to their career objective. For example, it would allow students with an interest in horticulture careers to enroll in predominantly plant science and/or horticulture courses to build a program geared to their specific needs. Animal science, agribusiness, entomology, and bioresources engineering technology are all potential areas in addition to plant science.

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 Agricultural Sciences in Newark.

OTHER COLLEGE RESOURCES

Cooperative Extension System. The Delaware Cooperative Extension System is part of a nationwide system whose mission is to enable people to improve their lives and communities by developing learning partnerships that put knowledge to work. It serves as an educational resource to the people of Delaware for extending research results and advances in technology.

A major thrust of the Cooperative Extension system is to target programs to address critical national issues. The accelerating expansion of technology, the deteriorating economic situation in portions of the agricultural sector, and the dynamic social conditions faced by many Americans, rural and metropolitan, require the Extension to reassess priorities and continuously adapt programs and activities to meet human needs.

Undergraduate students find opportunities to work with Extension specialists to gain practical experience in dealing with the public and in providing information to the public on a wide variety of agriculturally related topics.

Agricultural Experiment Station. The Experiment Station serves as the college's research arm, conducting research, fundamental and applied, in all phases of agriculture and rural life. By performing this function, it not only contributes to increased and efficient production and to improved marketing of agricultural products, but it serves to stabilize production by developing practices and techniques designed to protect crops and livestock against diseases, pests, and certain physical forces of nature. A majority of the professors in the College of Agricultural Sciences have appointments in the Experiment Station.

Students find many opportunities to work with these professors in independent study projects that introduce them to biological, economic, and engineering technology research in the agricultural disciplines. Advanced undergraduates often gain valuable experience working for a professor in a laboratory or in the field on Experiment Station-sponsored research.