University Bulletin

Undergraduate Degree Programs

Agricultural Sciences

The COLLEGE OF AGRICULTURAL SCIENCES is concerned with the conduct of education and research programs dealing with the proper utilization of land and water resources for the production of crops, livestock, and forest products to meet food and fiber needs, as well as plants for aesthetic use; protection and management of the environment, with its many ecological systems, so that it may be enjoyed by all; operation of agriculturally related industries that provide professional services to producers who process and market farm products; and the development of human resources and community services.

Agriculture is a science, a business, and a profession that requires many well-educated people to meet the demand for animal and plant specialists, conservationists, food technologists, environmental resource managers, engineers, veterinarians, entomologists, farm and forest managers, and many other agricultural professions. The college carries out its responsibilities through instruction, research, and extension. These activities are described more fully below.

UNDERGRADUATE EDUCATION

A WIDE RANGE of majors in the College of Agricultural Sciences offers students almost unlimited opportunities to merge their natural inclinations, talents, and specific individual abilities.

Students who are interested in studies in plant pathology can enroll in the undergraduate majors in Agronomy, Horticulture, or Forest Science.

Freshmen in a four-year program in the College of Agricultural Sciences study basic courses common to all majors. By deferring the selection of a major until the end of the sophomore year, students are given the opportunity to explore their interest areas and to acquire a better basis for making a decision.

A faculty adviser guides each student in choosing his or her course of study. Advisers are available throughout a student's college career to help plan course schedules and to assist with scholastic problems.

Admission requirements for the college are listed in the Admissions portion of the General Information section of this bulletin. The major in Agricultural and Biological Engineering is jointly administered by the Colleges of Agricultural Sciences and Engineering. Students who are interested in this major should consult requirements for admission to the College of Engineering.

Information on programs leading to the M.S. and Ph.D. degrees is given in the Penn State **Graduate Degree Programs Bulletin(http://www.gradsch.psu.edu/bulletin/)** .

MINOR programs enable students to supplement their four-year major. Minors are offered in Agricultural and Biological Engineering, Agribusiness Management, Agricultural Communications, Agricultural Economics and Rural Sociology, Agricultural Mechanization

Technology, Agronomy, Animal Sciences, Environmental and Renewable Resource Economics, Environmental Resource Management, Environmental Soil Science, Equine Science, Forest Science, Horticulture, International Agriculture, Leadership Development, Mushroom Science and Technology, Off-Road Equipment, Plant Pathology, Poultry and Avian Science, Wildlife and Fisheries Science, Wood Products Marketing, and Youth and Family Education.

TWO-YEAR MAJORS in Agricultural Business, Forest Technology, and Wildlife Technology lead to the associate degree. Students in these majors, who must begin study of technical subjects the first year, are given all possible assistance in planning their work by their faculty advisers.

TEACHER CERTIFICATION PROGRAM -- Agricultural students may qualify for certification to teach in the public school systems of Pennsylvania by completing the minimum course requirements of a subject matter field and the professional education requirements, which include student teaching. Professional courses are taken in the Department of Agricultural and Extension Education, College of Agricultural Sciences, and the College of Education. Students who are interested in teacher certification should see **Teacher Education Programs(general_information.cfm?section=SpecialAP6)** .

PRE-VETERINARY MEDICINE -- Although Penn State has no pre-veterinary medicine major, students can prepare for admission to veterinary school through a carefully selected major in the College of Agricultural Sciences. In most cases, students are not accepted to veterinary school prior to the completion of four or more years of college. Because of the limited number of admissions to veterinary schools, each candidate should select an undergraduate program that offers alternatives as well as preparation for admission to the professional program. The wide number of electives allowed in undergraduate majors in the College of Agricultural Sciences provides students with the opportunity to obtain strong preprofessional preparation in majors such as Animal Bioscience, Animal Sciences, and Wildlife and Fisheries Science.

Students who want to pursue studies in other disciplines of agriculture or in other colleges may obtain information about veterinary school admission requirements by contacting members of the faculty of the veterinary science, dairy and animal science, and poultry science departments.

CERTIFICATE PROGRAMS, CONFERENCES, AND SHORT COURSES

Certificate programs, conferences, and short courses are offered in agriculture and related areas, including programs of formal instruction of variable periods or short-course conference educational activities that may last from one day to several weeks.

Two certificate programs provide training in agriculturally related occupations--food technology and turfgrass management. The Food Technology certificate program, conducted on the Berks Campus, is a course of formal classroom and laboratory instruction. Information on this program may be obtained by contacting Continuing Education, Penn State Berks Campus, P.O. Box 7009, Reading, PA 19610-6009; 610-320-4874.

The Golf Course Turfgrass Management certificate program consists of two eight-week winter terms a year for two years, To gain practical experience, a six-month on-the-job internship is required between the first and second years. High school graduates 17 or older are eligible to apply. Admission to the program is limited and competitive. Offers to enroll are based on scholastic achievement, work experience, letters of recommendation, and the applicant's personal goals. Information on this program may be obtained by contacting the Department of Crop and Soil Sciences, 116 ASI Building, University Park, PA

16802; 814-865-6541.

The Turfgrass and Agricultural Equipment Services (TAE) certificate program is a two-year certificate with four eight-week sessions. Sessions are offered at the University Park campus with the fall session running late October through December and the spring session January through early March. There is a required internship between the first and second years of the program. Students enrolled in this program become service technicians in the agricultural, turfgrass, and related industries. They can apply the technical skills learned in the operation, repair and maintenance, and scheduling of equipment. Students in the TAE program study hydraulics and electrical, mechanical, and power transfer systems. They also learn to use comptuers for equipment scheduling, inventory, and maintenance records. The program is accredited by the Engine and Equipment Training Council. For information about this program, contact the Department of Agricultural and Biological Engineering, 249 Agricultural Engineeering Building, University Park, PA 16802; or Dr. James W. Hilton, 232 Agricultural Engineering Building, University Park, PA 16802; jwh2@psu.edu; 814-863-1817; or visit: **www.abet.org (http://www.abet.org)**.

Agricultural conferences and short courses are held regularly on the University Park Campus and around the state. The Office of Conferences and Short Courses works with Penn State faculty, government agencies, rural and urban organizations, and farm groups in planning and organizing these meetings. Using University-based resources, the conferences and short courses help businesses, industry, and individuals keep abreast of the latest developments that affect their lives and livelihoods. Conference announcements may be obtained from the Office of Conferences and Short Courses, The Pennsylvania State University, 306 Agricultural Administration Building, University Park, PA 16802-2601; 814-865-8301; Fax, 814-865-7050.

AGRICULTURAL RESEARCH

The college, in association with its counterparts in other states and in federal agencies, supports research related to the production and use of food, fiber, and forestry products and to the economic and social well-being of those living in rural and urban areas. It has a primary role in providing research information for use by the Penn State Cooperative Extension and other public educational institutions.

Not only does the college fund research to increase the economic and technical efficiency with which products are produced and utilized, but it also is concerned with finding ways of achieving greater agricultural abundance in harmony with the environment and of achieving an ever-increasing level of quality in those products. While the events of recent years have made readily apparent the justification for emphasis on research centering on production of feed and other renewable resources, the human welfare aspects of life in rural and urban areas also have been given attention.

To a large extent the research leaders are also actively engaged in the resident education, short course, and extension programs. The interaction enriches the content of the instructional experience and also guides the research efforts toward the solution of broad social concerns.

PENN STATE COOPERATIVE EXTENSION

Cooperative extension is a non-formal, community-based educational resource of Penn State, funded cooperatively by state and county governments and the U.S. Department of Agriculture. For more than seventy-five years, Pennsylvanians have turned to Penn State

Cooperative Extension for news ways to solve community and individual problems.

Each year, more than 2 million people participate in Penn State Cooperative Extension seminars, workshops, conferences, short courses, computer-assisted learning, learn-at-home programs and other activities. Countless others request information and guidance from county agents and their staff, and many more receive extension-related information through newspapers, radio, television, publications, Web sites, and other media.

About 300 county extension agents, 130 paraprofessionals, and 50,000 volunteers help plan, deliver, and evaluate cooperative extension education programs in all sixty-seven Pennsylvania counties. Teams of extension agents and Penn State faculty develop and provide leadership for educational programs and materials.

Penn State Cooperative Extension 4-H youth programs reach about 120,000 young people between the ages of 8 and 19 through organized clubs, special or short-term programs, school enrichment activities, and individual study. About 11,000 adult and 1,600 teen volunteer leaders work with county 4-H extension agents to deliver these programs. Youth participants come from cities (22 percent), suburbs (11 percent), medium-sized towns (21 percent), small towns (40 percent), and farms (6 percent).

Tapping Penn State's rich store of information, new research, and new thinking about issues relevant to citizens of the Commonwealth, Penn State Cooperative Extension offers a broad range of programs in areas vital to the quality of life in Pennsylvania, including agriculture; natural resources and environmental management; 4-H/youth development; community resources and economic development; family development and resource management; leadership and volunteer development; and nutrition, diet, and health.

SCHOOL OF FOREST RESOURCES

PROFESSOR CHARLES H. STRAUSS, *Director*

The School of Forest Resources provides professional education important to the proper management and utilization of renewable natural resources. These resources include forests, wildlife, and fisheries, managed to provide a variety of benefits to people, from the wood products that we use in construction, cabinets, furniture, and paper to the wild animals that we enjoy photographing and hunting. School programs emphasize conservation, which is the sustained use of resources to meet people's needs now and in the future.

ADMISSION--Admission requirements for the College of Agricultural Sciences are listed at the beginning of this section of the bulletin. Students who expect to continue in the School of Forest Resources should be prepared to take a course in calculus.

UNDERGRADUATE STUDENT SERVICES AND COUNSELING--The coordinator of undergraduate student programs is responsible for undergraduate curricula, general student advising, assignment of advisees, special academic programs, and employment.

GRADUATE EDUCATION--Students interested in advanced degrees should consult the **Graduate Degree Programs Bulletin(http://www.gradsch.psu.edu/bulletin/)** and the *Graduate Student Manual.*

COLLEGE OF AGRICULTURAL SCIENCES

BRUCE McPHERON, *Dean*

BARBARA J. CHRIST, *Senior Associate Dean*

J. MARCOS FERNANDEZ, *Associate Dean for Undergraduate Education*

ANN DODD, *Assistant Dean for Strategic Initiatives and Graduate Education*

COLLEGE ORGANIZATION

Agricultural and Biological Engineering -- ROY E. YOUNG, *Head*

[6](#mnote06) Agricultural and Biological Engineering -- PAUL H. HEINEMANN, *Program Coordinator*
Agricultural Systems Management -- PAUL H. HEINEMANN,*Program Coordinator*

Agricultural Economics and Rural Sociology -- STEPHEN M. SMITH, *Head*

Agricultural Business Management -- JAMES W. DUNN,*Program Coordinator*
Environmental and Renewable Resource Economics -- JAMES W. DUNN, *Program Coordinator*

Agricultural and Extension Education - - TRACY S. HOOVER, *Head*

Agricultural and Extension Education -- DENNIS C. SCANLON,*Program Coordinator*
Agricultural Science -- DENNIS C. SCANLON,*Program Coordinator*

Crop and Soil Sciences -- DAVID M. SYLVIA, *Head*

Environmental Soil Science -- KATHARINE BUTLER,*Program Coordinator*
Turfgrass Science -- A. J. TURGEON, *Program Coordinator*

Dairy and Animal Science -- TERRY D. ETHERTON, *Head*

Entomology -- GARY W. FELTON, *Head*

Food Science -- JOHN FLOROS, *Head*

STEPHANIE DOORES, *Program Coordinator*

Forest Resources (School of) -- MICHAEL G. MESSINA, *Director*

Forest Science -- PAUL R. BLANKENHORN, *Program Coordinator*
Wildlife and Fisheries Science --
Wood Products -- JAMIE MURPHY, *Program Coordinator*

Horticulture -- RICHARD P. MARINI, *Head*

Horticulture -- CHARLES W. HEUSER, *Program Coordinator*
Landscape Contracting -- DAN T. STEARNS, *Program Coordinator*

Plant Pathology -- BARBARA J. CHRIST, *Head*

Poultry Science -- ROBERT G. ELKIN, *Head*

Veterinary and Biomedical Sciences -- C. CHANNA REDDY, *Head*

INTERDEPARTMENTAL PROGRAMS

Agroecology -- PAUL A. BACKMAN,*Program Coordinator*

Animal Bioscience -- LESTER C. GRIEL, *Program Coordinator*

Animal Sciences -- HAROLD W. HARPSTER, *Program Coordinator*

Environmental Resource Management -- ROBERT D. SHANNON, *Program Coordinator*

[6] Offered jointly with the College of Engineering. Requirements are listed in the College of Engineering section of this bulletin.

Baccalaureate Degrees

Agribusiness Management

University Park, College of Agricultural Sciences (AG BM)
University Park, The Smeal College of Business

PROFESSOR JAMES W. DUNN, *Program Coordinator*

Graduates can be found working in the food production, processing, financial services, wholesaling and retailing industries, both in the United States and abroad. A substantial number are employed by agricultural supply firms. Typically, B.S. degree holders begin their careers in sales or as management trainees, and then progress to management as they develop higher levels of expertise and experience. Penn State Agribusiness Management graduates chose careers in many other places. They also are employed in banking and the investment and mutual funds industries, and others have gone to law school, graduate school, or into rural development. The quality and diversity of the program enables Agribusiness majors to undertake a variety of jobs.

This major, which is offered jointly with The Mary Jean and Frank P. Smeal College of Business, includes a core of courses required of all business students. Combining the required specialization area with a minor or electives also allows a student to focus on a particular area of interest.

For the B.S. degree in Agribusiness Management, a minimum of 120 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(15 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:

(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 12 credits

REQUIREMENTS FOR THE MAJOR: 78 credits
(This includes 15 credits of General Education courses: 6 credits of GQ courses; 6 credits of GS courses; 3 credits of GWS courses.)

PRESCRIBED COURSES (43 credits)
AG BM 102(3)**[1](#mnote01)**, AG BM 106(3)**[1](#mnote01)**, ECON 004 GS(3) (Sem: 1-4)
ACCTG 211(4), AG BM 302(3) **[1](#mnote01)**, AG BM 308W(3)**[1](#mnote01)**, AG BM 320(3)**[1](#mnote01)**, AG BM 338 IL(3), ENGL 202D GWS(3), MIS 204(3), SCM 200 GQ(4) (Sem: 3-4)
B A 301(2), B A 302(2), B A 303(2), B A 304(2) (Sem: 5-6)

ADDITIONAL COURSES (23 credits)
AG BM 101 GS(3)**[1](#mnote01)** or ECON 002 GS(3)**[1](#mnote01)** (Sem: 1-4)**[77](#mnote77)**
B A 243(4) or B A 241(2) and B A 242(2) (Sem: 2-6)
MATH 110 GQ(4) or MATH 140 GQ(4) (Sem: 3-4)
R SOC 011 GS(3) or SOC 001 GS(3) (Sem: 3-6) **[78](#mnote78)**
AG BM 407(3) or AG BM 408(3) (Sem: 5-8)
Select 6 credits of AG BM 440(3), AG BM 420(3), AG BM 460(3), or AG BM 438(3) (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS (12 credits)
Select 12 credits in a specialty area, in consultation with an adviser (at least 6 of these credits must be at the 300 or 400 level) (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.
[77] AG BM 101 required unless ECON 002 was taken before entering the AG BM major.
[78] R SOC 011 required unless SOC 001 was taken before entering the AG BM major.

Last Revised by the Department: Summer Session 2008

Blue Sheet Item #: 36-04-001

Review Date: 1/15/08

UCA Revision #1: 8/2/06

AG/BA

Agricultural and Extension Education

University Park, College of Agricultural Sciences (AEE)

ASSISTANT PROFESSOR JOHN C. EWING, *Program Coordinator*

This major helps prepare students for positions in education in agriculture, including schools and colleges, Cooperative Extension, business, trade and professional

associations, and government agencies. The Department administers a program approved by the Pennsylvania Department of Education for the preparation of agriculture teachers in public school systems. This includes programs in agricultural production, mechanics, supplies, resources, products, forestry, horticulture, and other agricultural areas.

Students take courses in agricultural and natural resource sciences, leadership and communications, natural science, social science and general education. Students seeking teacher certification schedule professional courses in education and psychology.

Pennsylvania Teacher certification regulations require students to have a GPA of 3.0; pass a series of PRAXIS pre-certification teacher examinations; documentation of at least 80 hours of volunteer or paid education work experience with learners of the age group the candidate plans to teach. At least 40 of these age-appropriate 80 hours must be with learners whose cultural, social, or ethnic backgrounds differ from the candidate's own; completion of an early field experience specified by the certification program; completion of at least 48 semester credit hours, including ENGL 015 or ENGL 030, 3 credits of literature, and 6 credits of quantification and secure occupational experience in the requested area of certification. (See also: **Teacher Education Programs(general_information.cfm?section=SpecialAP6)**)

For students seeking teacher certification, the B.S. degree in Agricultural and Extension Education, a minimum of 125-129 credits is required. For students selecting the Leadership Development and Communications option, a minimum of 122 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(13-22 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin for additional information)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in REQUIREMENTS FOR THE MAJOR)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 3-14 credits

REQUIREMENTS FOR THE MAJOR: 76-103 credits
(This includes 13-22 credits of General Education courses: 22 for the teacher certification options--6 credits of GS courses; 9 credits of GN courses; 4 credits of GQ courses; 3 credits of GWS courses; and 13 credits for the non-teacher certification option--6 credits of GS courses; 4 credits of GN courses; 3 credits of GWS courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 19 credits

PRESCRIBED COURSES (19 credits)
AG BM 101 GS(3), BIOL 110 GN(4), ENGL 202C GWS(3) (Sem: 3-4)
AEE 311(3), INTAG 100 GS;IL(3) (Sem: 5-6)
AEE 495(3) (Sem: 7-8)

REQUIREMENTS FOR THE OPTION: 57-84 credits

TEACHER CERTIFICATION OPTIONS

ENVIRONMENTAL SCIENCE OPTION: (84 credits)

PRESCRIBED COURSES (47 credits)
AGRO 028(3), AN SC 201(4), ASTRO 001 GN(3), CHEM 101 GN(3), CHEM 202(3), PHYS 001 GN(3) (Sem: 1-2)
EDPSY 014(3) [1](#mnote01) , EDTHP 115 US(3) [1](#mnote01) , WF ED 413(3) (Sem: 2-7)
AEE 100(2), AEE 295(1) [1](#mnote01) , SOILS 101 GN(3), STAT 200 GQ(4) (Sem: 3-4)
AEE 313(2) [1](#mnote01) , AEE 412(4) [1](#mnote01) , AEE 413(3) [1](#mnote01) (Sem: 5-8)

ADDITIONAL COURSES (7 credits)
BIOL 220W GN(4), BIOL 230W GN(4), or BIOL 240W GN(4) (Sem: 2-7)
A S M 101(3) or A S M 217(3) (Sem: 3-4)

SUPPORTING COURSES AND RELATED AREAS (30 credits)
Select 3 credits of W courses offered in the College (Sem:1-7)
Select 6 credits in biological, physical ecosystems (Sem: 1-7)
Select 6 credits in environmental impact management (Sem: 1-7)
Select 6 credits in environmental learning (Sem: 1-7)
Select 6 credits in social, political, and legal aspects of environmental science (Sem: 1-7)
Select 3 credits in agricultural systems management (Sem: 3-4)

PRODUCTION OPTION: (79 credits)

PRESCRIBED COURSES (40 credits)
ASTRO 001 GN(3), CHEM 101 GN(3), CHEM 202(3), PHYS 001 GN(3) (Sem: 1-2)
AEE 100(2), AEE 295(1) [1](#mnote01) , STAT 200 GQ(4) (Sem: 3-4)
EDPSY 014(3) [1](#mnote01) , EDTHP 115(3) [1](#mnote01) , SOILS 101 GN(3), WF ED 413(3) (Sem: 2-7)
AEE 313(2) [1](#mnote01) , AEE 412(4) [1](#mnote01) , AEE 413(3) [1](#mnote01) (Sem: 5-8)

ADDITIONAL COURSES (4 credits)
BIOL 220W GN(4), BIOL 230W GN(4), or BIOL 240W GN(4) (Sem: 2-7)

SUPPORTING COURSES AND RELATED AREAS (35 credits)
Select 3 credits of W courses offered in the College (Sem:1-7)
Select 14 credits in agriculture (Sem: 1-7)
Select 6 credits in animal science (Sem: 1-7)
Select 6 credits in plant/soil science (Sem: 1-7)
Select 6 credits in agricultural systems management (Sem: 3-6)

NON-TEACHER CERTIFICATION OPTION

LEADERSHIP DEVELOPMENT AND COMMUNICATIONS OPTION: (57 credits)

PRESCRIBED COURSES (9 credits)
AEE 360(3) [1](#mnote01) , AEE 460(3) [1](#mnote01) (Sem: 5-6)
AEE 465(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS: (48 credits)
Select 3 credits of W courses offered in the College (Sem:1-7)
From an approved department list select the following:
Select 6 credits of communications courses in consultation with adviser (Sem: 1-8)
Select 6 credits of moral and ethical dimensions of leadership courses in consultation with adviser (Sem: 1-8)
Select 6 credits of leadership style courses in consultation with adviser (Sem: 1-8)
Select 6 credits of global and multicultural perspective courses in consultation with adviser (Sem: 1-8)

Select 3 credits of Animal Science courses in consultation with adviser (Sem: 1-8)
Select 3 credits of Soil and Plant Science courses in consultation with adviser (Sem: 1-8)
Select 3 credits of Agricultural Business Management and/or Rural Sociology courses in consultation with adviser (Sem: 1-8)
Select 12 credits of Natural Resources courses in consultation with adviser (Sem: 1-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Spring Semester 2010

Blue Sheet Item #: 38-01-001

Review Date: 8/25/09

UCA Revision #1: 8/2/06

AG

Agricultural Science

University Park, College of Agricultural Sciences (AG SC)

ASSISTANT PROFESSOR JOHN C. EWING, *Program Coordinator*

This major enables students to develop programs of study to serve their individual needs by assembling courses selected from various departments within the College of Agricultural Sciences. The student develops either a broad background in agriculture or a special program of study not currently offered within departments of the college. Students are expected to focus study on one or more disciplines of the agricultural sciences by selecting a minor from the approved list of minors offered by the College of Agricultural Sciences. The student, in consultation with an adviser, is given considerable flexibility for selecting courses to satisfy individual interests and aspirations.

Students can prepare themselves for careers in agricultural and natural resource related sales, and /or public relations; food, agricultural and natural resource commodity groups, agricultural finance; governmental and conservation agencies; the Cooperative Extension Service; land use and appraisal; and international agriculture agencies.

For the B.S. degree in Agricultural Science, a minimum of 123 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(18-30 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in ELECTIVES, GENERAL EDUCATION course selection, or REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 9-27 credits

REQUIREMENTS FOR THE MAJOR: 81-87 credits
(This includes 18-30 credits of General Education courses: 0-3 credits of GA courses; 0-3 credits of GHA courses; 9 credits of GN courses; 0-6 credits of GS courses; 9 credits of GWS courses.)

PRESCRIBED COURSES (12 credits)
CAS 100 GWS(3), ENGL 015 GWS(3) (Sem: 1-2)
AEE 360(3), AEE 460(3) (Sem: 5-8)

ADDITIONAL COURSES (36-39 credits)
BIOL 011 GN(3) and BIOL 012 GN(1), or BI SC 003 GN(3) (Sem: 1-2)
CHEM 101 GN(3) or CHEM 110 GN(3) (Sem: 1-4)
Select 3 credits from ENGL 202C GWS(3), ENGL 202D GWS(3) (Sem: 3-4)
Select 3 credits from AEE 330W(3), AEE 440(3) (Sem: 4-7)
Select 3-4 credits from A S M 101(3), AGRO 028(3), FORT 220(4) (Sem: 5-6)
Select 3 credits from HORT 101 GN(3), HORT 202(3), SOILS 101 GN(3) (Sem: 5-6)
Select 3 credits from AG BM 101 GS(3), AG BM 200(3), AG EC 450 IL(3), INTAG 100 GS;IL(3), R SOC 011 GS;US(3), R SOC/WMNST 420 US;IL(3) (Sem: 5-6)
Select 3-4 credits from AN SC 201(4), AN SC 211(3), ENT 313(2) and ENT 314(1) or ENT 315(1) or ENT 316(1) (Sem: 5-6)
Select 3 credits from AEE 465(3), FD SC 105 GHA(3), FD SC 200(3), LARCH 060 GA;US;IL(3), S T S 200 GS(3) (Sem: 5-6)
Select 3 credits from AGECO 134 GN(3), AGECO 201(3), W F S 209 GN(3) (Sem: 5-6)
AEE 400(3) or INTAG 481(3) (Sem: 6-7)
AEE 311(3) or AEE 465(3) (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS (33-36 credits)
Select 6 credits from natural science (Sem: 3-8)
Select 9 credits from plant science, soil science, food science, or A S M (Sem: 5-8)
Select 18-21 credits for College Ag Sciences Mino**[1](#mnote01)** (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2006

Blue Sheet Item #: 34-01-002

Review Date: 8/30/05

UCA Revision #1: 8/2/06

AG

Agricultural Systems Management

University Park, College of Agricultural Sciences (A S M)

PROFESSOR PAUL HEINEMANN, *Program Coordinator*

Career opportunities for the Agricultural Systems Management graduates exist in the production and management phases of agricultural enterprises. Graduates are employed as sales and field representatives, financial and technical consultants, and technical service or production personnel. Employment opportunities exist in the management and application of technology to power and machinery systems, soil and water systems, food production and processing systems, and agricultural structures and environmental

systems.

This is an applied major that combines the study of agricultural sciences, engineering technology, natural resources, business, and management systems. The program is administered through the Department of Agricultural and Biological Engineering, which offers a series of courses to provide the technical background for the graduate. Basic study is emphasized in the agricultural and business management sciences, along with the application of the technical results of engineering research, design, and manufacturing. Graduates of this major apply their technology/management training to the diverse areas of food and fiber production, food processing, and management of land and water resources.

For the B.S. degree in Agricultural Systems Management, a minimum of 123 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(30 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in REQUIREMENTS FOR THE MAJOR course selection)

UNITED STATES CULTURES AND INTERCULTURAL CULTURES:
(Included in GENERAL EDUCATION course selection or REQUIREMENTS FOR THE MAJOR)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

REQUIREMENTS FOR THE MAJOR: 108 credits
(This includes 30 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 6 credits of GS courses; 9 credits of GWS courses.)

PRESCRIBED COURSES (76 credits)
ACCTG 211(4), CAS 100A GWS(3), CHEM 110 GN(3), CHEM 111 GN(1), ECON 004 GS(3), EDSGN 100(3)) **[1](#mnote01)** , ENGL 015 GWS(3), MATH 110 GQ(4) **[1](#mnote01)** , PHYS 250 GN(4) **[1](#mnote01)** (Sem: 1-2)
A S M 221(3) **[1](#mnote01)** , AG BM 106(3) **[1](#mnote01)** , AG BM 220(3) **[1](#mnote01)** , AN SC 201(4), SOILS 101 GN(3), STAT 200 GQ(4) (Sem: 3-4)
A S M 310(3) **[1](#mnote01)** , A S M 327(3) **[1](#mnote01)** , A S M 391 GWS(2), A S M 422(3), A S M 425(3), SCM 404(3) (Sem: 5-6)
A S M 392 GWS(2), A S M 428(3), A S M 429W(3), AG BM 407(3) (Sem: 7-8)

ADDITIONAL COURSES (14 credits)
Select 1 credit of First-Year Seminar (Sem: 1-2)
AG BM 101 GS(3) or ECON 002 GS(3) (Sem: 3-4)
AG 301W(3) or B LAW 243(3) (Sem: 3-4)
BIOL 110 GN(4) **[1](#mnote01)** or BIOL 011 GN(3) **[1](#mnote01)** and BIOL 012 GN(1) **[1](#mnote01)** (Sem: 3-4)
AGRO 028(3) or HORT 101(3) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (18 credits)
Select 3 credits in A S M from department list (Sem: 5-8)
Select 6 credits in agriculture/biology from department list (Sem: 5-8)
Select 6 credits in business management from department list (Sem: 7-8)
Select 3 credits of a supporting course from department list (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in

Senate Policy 82-44.

Last Revised by the Department: Summer Session 2007

Blue Sheet Item #: 35-01-001

Review Date: 6/9/08

UCA Revision #1: 8/2/06
UCA Revision #2: 7/26/07

AG

Agroecology

University Park, College of Agricultural Sciences (AGECO)

PROFESSOR PAUL A. BACKMAN, *Program Coordinator*

The coordinator position will rotate between faculty members in the Departments of Crop and Soil Sciences, Entomology, Horticulture, and Plant Pathology.

Agroecology is concerned with the principles and practices applicable to the management of plant agroecosystems. There are two options: Integrated Crop Management (ICM) or Plant Science. Education in the Integrated Crop Management option emphasizes the principles of plant and soil management and the basic sciences upon which these principles are based. The Plant Science option requires additional emphasis in the basic sciences (mathematics, chemistry, physics, and biotechnology). The opportunity is available in either option to specialize in agronomy with emphasis on agronomic crops and conservation of soils; or horticulture with emphasis on horticultural crops; or entomology with emphasis on insects and their impact on the ecosystem; or plant pathology with emphasis on plant diseases. Students must develop, communicate, and apply technical information about plants, soils, environment, and production practices for food, feed, fiber, or ornamental crops. Business management skills can be developed by appropriate course selection in the ICM option.

Graduates in Agroecology have a wide choice of careers. Over 90% get jobs in service to the agricultural industry as farm managers, farm chemical and fertilizer store managers, sales representatives, field and laboratory technicians, crop management consultants, extension agents, soil and water conservationists and inspectors for various state and federal regulatory agencies. Some may return to the farm and become producers of farm products.

Those students who anticipate enrollment in graduate school should elect the Plant Science option while those preparing to enter the profession with a B.S. degree should select the Integrated Crop Management option.

For the B.S. degree in Agroecology, a minimum of 123 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(27 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 2-8 credits

REQUIREMENTS FOR THE MAJOR: 97-103 credits
(This includes 27 credits of General Education courses: 9 credits of GN courses; 6 credits of GH courses; 6 credits of GQ courses; 3 credits of GS courses; 3 credits of GWS courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 56 credits

PRESCRIBED COURSES (47 credits)
BIOL 110 GN(4)[1](#mnote01), BIOL 222(3) (Sem: 1-4)
CHEM 110 GN(3)[1](#mnote01), CHEM 111 GN(1), CHEM 112 GN(3)[1](#mnote01),
PHIL 010 GH(3) (Sem: 1-4)
AG 160 GH(3) (Sem: 1-4)
CMPSC 203 GQ(4) (Sem: 3-4)
SOILS 101 GN(3)[1](#mnote01) (Sem: 3-4)
AGECO 201(3), AGECO 457(3), AGECO 461(3) (Sem: 3-8)
AGRO 410W(4), AGRO 438(4) (Sem: 5-8)
PPATH 405(3) (Sem: 5-6)

ADDITIONAL COURSES (9 credits)
AG BM 101 GS(3) or ECON 002 GS(3) (Sem: 1-4)
AGRO 028(3)[1](#mnote01) or HORT 101 GN(3)[1](#mnote01) (Sem: 3-4)
ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 7-8)

REQUIREMENTS FOR THE OPTION: 41-47 credits

INTEGRATED CROP MANAGEMENT OPTION: (41 credits)

PRESCRIBED COURSES (15 credits)
BIOL 127 GN(3)[1](#mnote01) (Sem: 1-2)
MATH 022 GQ(3) (Sem: 1-4)
AEE 440(3) (Sem: 3-6)
AGECO 295(1), AGECO 495(1), AGECO 490(1) (Sem: 3-8)
SOILS 402(3) (Sem: 7-8)

ADDITIONAL COURSES (6 credits)
AGRO 423(3) and AGRO 425(3); or HORT 202(3) and HORT 315(3) (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS (20 credits)
In consultation with an adviser, select 20 credits in a specialty area as follows:
Select 6 credits from business-related course list (Sem: 3-8)
Select 11 credits from general course list (Sem: 3-8)
Select 3 credits from insect biology and pest management (Sem: 5-6)

PLANT SCIENCE OPTION: (46-47 credits)

PRESCRIBED COURSES (23 credits)
CHEM 113B GN(1), MATH 140B GQ(4), MATH 141B GQ(4) (Sem: 1-4)
AGECO 295(1) (Sem: 3-5)
AGECO 495(1), AGECO 490(1), PHYS 250 GN(4), PHYS 251 GN(4) (Sem: 5-8)
STAT 250 GQ(3) (Sem: 7-8)

ADDITIONAL COURSES (6-7 credits)

CHEM 202(3) or CHEM 210(3) (Sem: 1-4)
BIOL 230W GN(4) or B M B 251(3) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (17 credits)
Select 14 credits from department science option list (Sem: 3-8)
Select 3 credits from insect biology and pest management (Sem: 5-6)

[1]A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2009

Blue Sheet Item #: 37-05-001

Review Date: 2/24/09

UCA Revision #1: 8/2/06

AG

Animal Sciences

University Park, College of Agricultural Sciences (ANSCI)

Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.

PROFESSOR HAROLD W. HARPSTER, *Program Coordinator*
COOPERATING DEPARTMENTS: Dairy and Animal Science and Poultry Science

Animal Science may be defined as the study and integration of all disciplines that relate to the function and care of animals for the benefit of humankind by providing companionship, food, fiber, and research. The Animal Sciences major includes references to all types of animals.

The educational experiences included in this major should prepare the student for a wide range of entry-level positions in production agriculture agribusiness, and allied industries, and provide preparation for the pursuit of post-baccalaureate studies leading to professional or advanced degrees. The student is expected to develop a comprehensive understanding of the biological and physical sciences underlying the functioning of all types of animals.

Realizing the wide range of career possibilities requiring diverse types of academic preparation, two options of study are available: the Business/Management Option and the Science Option.

For the B. S. degree in Animal Sciences, a minimum of 124 credits is required.

BUSINESS/MANAGEMENT OPTION: The primary objective of this option is to prepare the student for entry-level positions in agribusiness organizations and in the animal and food industries. The student may develop a program with specie specialization or diversity. The student may develop a foundation in accounting, economics, finance, marketing, and other business-related areas. Graduates seek entry-level employment opportunities as loan officers with financial institutions; technical service and sales representatives for pharmaceutical, agri-chemical, feed or food producing companies; field representatives for breed organizations or producer cooperatives; public relations and human resources personnel for agribusiness companies; management trainees for numerous agribusiness firms; and management trainees or assistant managers of animal production units.

SCIENCE OPTION: The primary objective of this option is to prepare the student for entry into post-baccalaureate study programs in the animal and related sciences. Graduates who have obtained the proper qualifications may pursue advanced studies in a wide variety of disciplines, including animal science, biotechnology, genetics, microbiology, nutrition, physiology, pharmaceutical research, and veterinary medicine. Graduates not desiring to pursue advanced studies seek entry-level employment opportunities as research technicians, technical service representatives for various industrial companies, food inspectors, laboratory animal caretakers, and public relations personnel.

TO VIEW THE **Animal Sciences Minor (ANSCI)(minors.cfm?letter=A&program=anscimin.htm)**

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(18-21 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in ELECTIVES, GENERAL EDUCATION course selection, or REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 0-13 credits

REQUIREMENTS FOR THE MAJOR: 87-97 credits
(This includes 18-21 credits of General Education courses: 0-3 credits of GA courses; 9 credits of GN courses; 3 credits of GS courses; 6 credits of GQ courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 35-41 credits

PRESCRIBED COURSES (21 credits)
AN SC 201(4)**[1](#mnote01)** , AN SC 207(2)**[1](#mnote01)** , AN SC 208(1)**[1](#mnote01)** , AN SC 290W(1), AN SC 300 GN(3) **[1](#mnote01)** , CHEM 202(3) (Sem: 3-4)
AN SC 301(3)**[1](#mnote01)** , B M B 211(3) (Sem: 3-6)
AN SC 400(1) (Sem: 7-8)

ADDITIONAL COURSES (11-15 credits)
AG BM 101 GS(3) or ECON 002 GS(3) (Sem: 1-2)
Select 6-8 credits from:
-- select 3-4 from MATH 021 GQ(3), MATH 022 GQ(3), MATH 110 GQ(4), or MATH 140 GQ(4) (Sem: 1-2)
-- select 2-4 from CMPSC 101 GQ(3), CMPSC 203 GQ(4), MATH 022 GQ(3), MATH 111 GQ(2), MATH 141 GQ(4), STAT 100 GQ(3), STAT 200 GQ(4), or STAT 250 GQ(3) (Sem: 1-2)
Select 2-4 credits)**[1](#mnote01)** from AN SC 305(3), AN SC 306(3), AN SC 308(4), AN SC 309(4), AN SC 310(3), AN SC 311(4), AN SC 314(2), AN SC 324(3), or AN SC 327(3) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (3-5 credits)
Select 3-5 credits in communication skills courses from department list. Certain courses may double count as general education courses; consult with your adviser. (Sem: 7-8)

REQUIREMENTS FOR THE OPTION: 52-56 credits

BUSINESS/MANAGEMENT OPTION: (53-56 credits)

PRESCRIBED COURSES (10 credits)
CHEM 101 GN(3) (Sem: 1-2)
ACCTG 211(4) (Sem: 3-4)
AN SC 322(3) (Sem: 5-6)

ADDITIONAL COURSES (20-23 credits)
BIOL 011 GN(3), BIOL 012 GN(1); or BIOL 110 GN(4) (Sem: 1-4)
AG BM 102(3) or MKTG 221(3) (Sem: 3-4)
AG BM 200(3) or MGMT 100(3) (Sem: 3-4)
MICRB 106 GN(3), MICRB 107 GN(1); or MICRB 201(3), MICRB 202(2) (Sem: 5-6)
Select 3-4 credits from AN SC 305(3), AN SC 306(3), AN SC 308(4), AN SC 309(4), AN SC 310(3), AN SC 311(4), AN SC 324(3), AN SC 327(3), AN SC 405(3), AN SC 407(3), or AN SC 410(4)(Sem: 5-8)
Select 3-4 credits from AN SC 420(4), AN SC 423(3), AN SC 427(3), AN SC 431W(4), or AN SC 442(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (23 credits)
Select 23 credits (at least 9 credits of business and 9 credits of production courses; 12 credits must be 400-level courses) from department list (Sem: 5-8)
(Students may apply 6 credits of ROTC.)

SCIENCE OPTION: (52-55 credits)

PRESCRIBED COURSES (34 credits)
CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3), CHEM 113 GN(1) (Sem: 1-2)
BIOL 110 GN(4), CHEM 203(3) (Sem: 3-4)
B M B 212(1), B M B 221(2) (Sem: 5-6)
MICRB 201(3), MICRB 202(2), PHYS 250 GN(4) (Sem: 5-6)
AN SC 423(3), AN SC 431W(4) (Sem: 7-8)

ADDITIONAL COURSES (13-14 credits)
BIOL 220W GN(4), BIOL 230W GN(4), or BIOL 240W GN(4) (Sem: 3-4)
AGRO 028(3), AN SC 213(3), or SOILS 101 GN(3) (Sem: 5-6)
AN SC 322(3), BIOL 133 GN(3), or BIOL 222(3) (Sem: 5-6)
Select 3-4 credits from AN SC 306(3), AN SC 308(4), AN SC 309(4), AN SC 405(3), AN SC 407(3), AN SC 410(4), or AN SC 413(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (5-7 credits)
Select 5-7 credits of 400-level courses from department list
(Students may apply 6 credits of ROTC.) (Sem: 7-8)

Integrated B.S. in Animal Sciences and Master of Biotechnology in Biotechnology

Qualified students should formally apply to the Master of Biotechnology degree when they have earned a minimum of 75 credits in their B.S. curriculum. To make sure students finish within the shortest time-to-degree, students intending to apply to the integrated program will be closely mentored by their respective undergraduate program coordinators to guide their progress through their B.S. curriculum. The undergraduate program coordinators will be directly consulted by the Director of the Master of Biotechnology in Biotechnology program regarding admission of a student applicant to the Master of Biotechnology in Biotechnology program.

Students admitted to the integrated program will follow their undergraduate curriculum until the beginning of their fourth year, at which time, they start taking courses required for

the Master of Biotechnology degree. In the summer following the Spring semester of their fourth year, students will participate in off-campus internships and have the option of either continuing at their off-campus location for their research project in the following Fall semester, or coming back to campus to do a research project. The final Spring semester will be devoted to completing the course and credit requirements for the Master of Biotechnology degree. As designed, students can opt to graduate with a B.S. degree at the end of the Spring semester of their 4th year, when they should have completed the credit requirements of the B.S. degree program (125 credits). The following table outlines the program of study for students in this program:

Year	Semester	B.S. Animal Sciences (125 credits required) credits completed
I	Fall	15
	Spring	16
II	Fall	15.5
	Spring	16
III	Fall	15
	Spring	15.5
IV	Fall	15*
	Spring	17*
Total credits for B.S.		**125**

* The following courses to be taken in these semesters will be cross-counted towards the B.S. and Master of Biotechnology. degrees:
BIOTC 479. Methods in Biofermentation OR CH E 409 (3 credits)
B M B 400. Molecular Biology of the Gene (2-3 credits)
IBIOS 571. Current Issues in Biotechnology (2 credits)
IBIOS 591. Ethics in the Life Sciences (1 credit)
IBIOS 593. Molecular Biology Laboratory (3 credits)

Total credits cross-counted in B.S. and Master of Biotechnology degrees	**12 credits, 6 of which are 500-level credits**

Master of Biotechnology in Biotechnology (30 credits required, 18 of which must be 500-level)

IV	Summer	IBIOS 595 or equivalent in AN SC (2 credits) Internship
V	Fall	IBIOS 594. Research Project (3-6 credits)
	Spring	IBIOS 590. Colloquium (1 credit) Electives, 500-level (3-6 credits) Other graduate level electives (6 credits)

Minimum total credits earned for Summer and 5th year	**18 credits, at least 12 of which are 500-level credits**

Admission Requirements

Students must have a GPA of 3.5 at the time of application to the integrated degree program when they have completed at least 75 credits of their B.S. curriculum. The GRE scores normally required in the Master of Biotechnolgy in Biotechnology program will be waived for applicants to the integrated B.S.-Master of Biotechnology degree.

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2006 (ANSCI); Summer Session 2006 (Integrated B.S./Master of Biotechnology in Biotechnology-Grad. Degree Name Change)

Blue Sheet Item #: 34-01-003 (ANSCI); 34-06-001 (Integrated B.S./Master of Biotechnology in Biotechnology)

Review Date: 6/9/08

UCA Revision #1: 8/2/06

AG

Biological Engineering

University Park, College of Agricultural Sciences
University Park, College of Engineering (B E)

PROFESSOR ROY E. YOUNG, *Head of the Department of Agricultural and Biological Engineering*

This major helps prepare students for careers involving the application of engineering principles to agricultural and biological production systems, processing systems, and conservation of land and water resources. Education in mathematics, physics, and engineering sciences common to all engineering disciplines is provided along with specialized training in biological and agricultural sciences. The curriculum covers all areas of agricultural and biological engineering, including food engineering, postharvest handling and processing of commodities, power and machinery development and applications, resource management and utilization, soil and water management, and structures and their environmental modifications, product synthesis using microbiological organisms, and food safety. A student can select the Agricultural Engineering option or the Biological and Food Engineering option.

Early career Biological Engineering graduates will:

1. Enter careers and/or advanced studies in bio-based production, processing, and sustainable environments;
2. Lead teams in analyzing and resolving technical challenges;
3. Qualify for pursuit of professional engineering registration; and
4. Keep abreast of contemporary issues in the field and workplace.

Design experiences are integrated throughout the junior-year curriculum by having students solve problems typical of those encountered in the agricultural and biological engineering profession. Two major design experiences in the senior year emphasize that agricultural and biological engineers must learn not only how to create and use the newest

technology, but also to assess and manage the social and ethical consequences of that technology.

Careers for graduates include design, development, and research engineering positions involving food processing, machinery development, soil and water management, materials handling, biological product development, and structural systems for animals, plants, and crop storage. Agricultural and biological engineers are employed in industry, consulting firms, and governmental agencies in the United States and abroad. Graduates deal with the various engineering aspects associated with production and processing of food, fiber, and other biological materials, within the constraints of environmental protection and natural resource conservation.

For the B.S. degree in Biological Engineering, a minimum of 130 credits is required. The baccalaureate program in Biological Engineering at University Park is accredited by the Engineering Accreditation Commission of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone 410-347-7700; or www.abet.org .

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(27-28.5 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in front of*Bulletin.)*

FIRST-YEAR SEMINAR:
(Included in REQUIREMENTS FOR THE MAJOR)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

REQUIREMENTS FOR THE MAJOR: 112-113.5 credits
(This includes 27-28.5 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 9 credits of GWS courses; and 1.5 credits of GHA courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 79 credits

PRESCRIBED COURSES (75 credits)
CAS 100A GWS(3), CHEM 110 GN(3) **[1](#mnote01)** , CHEM 111 GN(1), E MCH 211(3)**[1](#mnote01)** , EDSGN 100(3), ENGL 015 GWS(3), MATH 140 GQ(4)**[1](#mnote01)** , MATH 141 GQ(4) **[1](#mnote01)** , PHYS 211 GN(4) **[1](#mnote01)** (Sem: 1-2)
E MCH 212(3) **[1](#mnote01)** , E MCH 213(3) **[1](#mnote01)** , M E 300(3) **[1](#mnote01)** , MATH 231(2), MATH 251(4), PHYS 212 GN(4) (Sem: 3-4)
B E 300(3) **[1](#mnote01)** , B E 301(3) **[1](#mnote01)** , B E 302(3) **[1](#mnote01)** , B E 304(3) **[1](#mnote01)** , B E 305(3) **[1](#mnote01)** , B E 308(3) **[1](#mnote01)** , B E 391 GWS(2), I E 424(3), (Sem: 5-6)
B E 392 GWS(2), B E 469W(3) (Sem: 7-8)

ADDITIONAL COURSES (4 credits)
Select 1 credit of First-Year Seminar (Sem: 1-2)
AG BM 101 GS(3) or ECON 002 GS(3), or ECON 004 GS(3) (Sem: 3-4)

REQUIREMENTS FOR THE OPTION: 33-34.5 credits

AGRICULTURAL ENGINEERING OPTION: 33 credits

PRESCRIBED COURSES (9 credits)
B E 303(2) [1](#mnote01), B E 306(2) [1](#mnote01), B E 307(2) [1](#mnote01), C E 360(3) [1](#mnote01) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (24 credits)
Select 3 credits in math/basic science science [26](#mnote01) (Sem: 3-6)
Select 6 credits in engineering science/desig [26](#mnote01) (Sem: 5-8)
Select 3 credits in agricultural/biological scienc [26](#mnote01)
Select 6 credits in agricultural and biological engineerin [26](#mnote01) (Sem: 7-8)
Select 6 credits in technical selectio [26](#mnote01) (Sem: 7-8)
(Students may apply 3 credits of ROTC to the technical selection category and 3 credits to the GHA category upon completion of the ROTC program.)

BIOLOGICAL AND FOOD ENGINEERING OPTION: 34.5 credits

PRESCRIBED COURSES (16.5 credits)
B M B 211(3), CHEM 202(3), M E 320(3) [1](#mnote01), NUTR 100 GHA(1.5) (Sem: 5-6)
B E 465(3), B E 468(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (18 credits)
Select 6 credits in emphasis technical elective [26](#mnote01) (Sem: 7-8)
Select 6 credits in any engineering science/desig [26](#mnote01) (Sem: 7-8)
Select 6 credits in technical selectio [26](#mnote01) (Sem: 7-8)
(Students may apply 3 credits of ROTC to the technical selection category and 3 credits to the GHA category upon completion of the ROTC program.)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.
[26] Courses to be selected from a list approved by the Agricultural and Biological Engineering faculty. These courses must be chosen so that the engineering design and engineering science requirements for the major are met.

Last Revised by the Department: Spring Semester 2009

Blue Sheet Item #: 37-06-039

Review Date: 4/14/09

UCA Revision #1: 8/2/06
UCA Revision #2: 7/26/07

Comments (http://www.psu.edu/bulletins/bluebook/contact)

EN

Community, Environment and Development

University Park, College of Agricultural Sciences (CED)

PROFESSOR JILL L. FINDEIS, *Program Coordinator*

The principal goal of the Community, Environment and Development (CED) major is to develop the knowledge and skills of undergraduate students to enable them to assist local people, their communities, and institutions effectively understand, respond to and ultimately shape economic and social changes, including those that pose risks to the environment. The CED major focuses on the fields of community and economic

development, environment and natural resources, and the critically important interactions between these fields, both locally and globally. Building skills and knowledge to tackle important environment and development issues facing communities today requires a multi-disciplinary or trans-disciplinary program; the major bridges the disciplines of agricultural, environmental and regional economics on the one hand and rural sociology on the other. Foundation (Level I) courses introduce students to key concepts in economics and sociology, and examine how these disciplines contribute to the basic content knowledge encompassing community and economic development and environmental economics and sociology. Level II courses build on the Foundation courses by extending the content knowledge to address the interrelationship between environment and natural resources and community and economic development. Coursework in Methods, Quantification and Communication is also required, including methods and techniques such as Geographical Information Systems and Geographical Information Analysis, statistics and survey research methods. Finally, students select among three Options: 1) Community and Economic Development, 2) Environmental Economics and Policy, and 3) International Development. Students specialize in an option that further allows them to develop skills and competencies matching their specific education and career goals. It is expected that some students completing the program will choose to attend graduate school or law school, while others will choose employment after graduation.

For the B.S. degree in Community, Environment and Development, a minimum of 120 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(21 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in front of*Bulletin*.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selections)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES, GENERAL EDUCATION, or REQUIREMENTS FOR THE MAJOR course selections)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 5-8 credits

REQUIREMENTS FOR THE MAJOR: 88-91 credits
(This includes 21 credits of General Education courses: 6 credits of GQ courses, 6 credits of GS courses, 9 credits of GWS.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 58-60 credits

PRESCRIBED COURSES (40 credits)
CED 152(3)[1](#mnote01), CED 230(3)[1](#mnote01), CED 201(3)[1](#mnote01), ENGL 015 GWS(3) (Sem: 2)
ECON 004 GS(3), GEOG 160 GS(3) (Sem: 3)
CAS 100 GWS(3), CED 309(3)[1](#mnote01), R SOC 327(3)[1](#mnote01), STAT 200 GQ(4) (Sem: 4)
R SOC 417(3) (Sem: 5)
CED 404(3) (Sem: 6)
CED 475(3) (Sem: 8)

ADDITIONAL COURSES (18-20 credits)

AG BM 101 GS(3) or ECON 002 GS(3) (Sem: 1)
R SOC 011 GS;US(3) or SOC 001 GS(3) (Sem: 1)
MATH 022 GQ(3) or MATH 110 GQ(4) or MATH 140 GQ(4) (Sem: 1)
CMPSC 101 GQ(3) or CMPSC 203 GQ(4) (Sem: 3)
PL SC 001 GS(3) or PL SC 003 GS (3) or PL SC 014 GS(3) (Sem: 3)
ENGL 202A GWS(3), ENGL 202B GWS;IL(3), ENGL 202C GWS;IL(3), or ENGL 202D GWS(3) (Sem: 5)

REQUIREMENTS FOR THE OPTION: 30 credits

COMMUNITY AND ECONOMIC DEVELOPMENT OPTION (30 credits)

PRESCRIBED COURSES (15 credits)
SOC 023 GS(3), CEDEV 430(3) (Sem:5)
CEDEV 452(3) (Sem:6)
AEE 460(3) (Sem:7)
CED 409(3) (Sem: 8)

ADDITIONAL COURSES (3 credits)
E R M 411(3) or B LAW 425(3) (Sem: 7)

SUPPORTING COURSES AND RELATED AREAS (12 credits)
Select 12 credit in specialization (Sem: 5-8)

ENVIRONMENTAL ECONOMICS AND POLICY (30 credits)

PRESCRIBED COURSES (12 credits)
ECON 302 GS(3) (Sem:5)
E RRE 431W(3), ECON 428(3) (Sem:7)
E RRE 429(3) (Sem: 8)

ADDITIONAL COURSES (3 credits)
E R M 411(3) or B LAW 425(3) (Sem:7)

SUPPORTING COURSES AND RELATED AREAS (15 credits)
Select 3 credits of Environmental Science from approved department list.
Select 12 credits in specialization (Sem: 5-8)

INTERNATIONAL DEVELOPMENT OPTION (30 credits)

PRESCRIBED COURSES (18 credits)
SOC 023 GS(3), R SOC 470(3) (Sem: 5)
CED 410(3) (Sem: 6)
CED 425(3), AG EC 450 IL(3) (Sem: 7)
R SOC 420 US;IL(3) (Sem: 8)

SUPPORTING COURSES AND RELATED AREAS (12 credits)
Select 12 credit in specialization (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2007

Blue Sheet Item #: 35-04-001

Review Date: 1/16/07

Comments (http://www.psu.edu/bulletins/bluebook/contact)

Environmental Resource Management

University Park, College of Agricultural Sciences (E R M)

PROFESSOR ROBERT D. SHANNON, *Program Coordinator*

Environmental Resource Management (E R M) is an interdisciplinary, science-based major designed to prepare students to understand and critically analyze environmental problems ranging from local to global in scale, identify solutions, and communicate ideas related to environmental and natural resource issues. The E R M major also focuses on human interactions with the environment by emphasizing the management of environmental resources. The E R M curriculum begins with foundation course work in the biological, physical and social sciences. Later courses apply these principles to the management and sustainability of the environment, and include environmental problem-solving, ecosystem management and environmental law. The third tier, offered through two options, affords considerable flexibility and the opportunity to specialize.

The major prepares students for employment in a variety of environmental positions, including environmental consulting, public agencies, and non profit organizations. Students are also prepared for graduate school or law school upon graduation. Realizing the wide range of career possibilities requiring diverse types of academic preparation, two options of study are available: the Environmental Science Option and the Soil Science Option.

In the Environmental Science Option, students select a minor or choose a group of courses (totaling at least 18 credits) that focus on a particular aspect of the environment. Examples include watersheds and water resources, climate change impacts, geographic information systems, energy and air pollution, ecology, environmental engineering, wildlife and fisheries science, and others. Courses and minors from across the University can be selected to develop a student's area of specialization in the Environmental Sciences Option.

In the Soil Science Option, students take courses in soil composition and properties, conservation, nutrient management, soil ecology, GIS and mapping. This option also allows the student to choose courses that support their strengths and interests. The option prepares students for positions with private, public, and non-profit firms that evaluate soils for various uses, delineate wetlands, perform environmental and hydrological assessments, and identify and remediate contaminated soils.

For the B.S. degree in Environmental Resource Management, a minimum of 120 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(27-30 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR: 1-3 credits
(Included in REQUIREMENTS FOR THE MAJOR)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 0-8 credits

REQUIREMENTS FOR THE MAJOR: 93-107 credits
(This includes 27-30 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 6 credits of GS courses; 9 credits of GWS courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 46-47 credits

PRESCRIBED COURSES (32 credits)
CAS 100 GWS(3), ENGL 015 GWS(3), E R M 151(1) [1](#mnote01) (Sem: 1-2)
CHEM 110 GN(3) [1](#mnote01), CHEM 111 GN(1) [1](#mnote01), CHEM 112 GN(3), CHEM 202(3) (Sem: 1-4)
SOILS 101 GN(3)[1](#mnote01) (Sem: 3-4)
A S M 327(3)[1](#mnote01), ENGL 202C GWS(3), E R M 300(3) [1](#mnote01), E R M 411(3)[1](#mnote01) (Sem: 5-8)

ADDITIONAL COURSES (14-15 credits)
MATH 110 GQ(4) or MATH 140 GQ(4) (Sem: 1-2)
AG BM 101 GS(3) or ECON 002 GS(3) (Sem: 1-2)
PHYS 211 GN(4) or PHYS 250 GN(4); STAT 200 GQ(4) or STAT 240 GQ(3) or STAT 250 GQ(3) (Sem: 3-4)

REQUIREMENTS FOR THE OPTION: 47-60 credits

ENVIRONMENTAL SCIENCE OPTION: (58-60 credits)

PRESCRIBED COURSES (26 credits)
AG BM 200(3), BIOL 110 GN(4) [1](#mnote01), BIOL 220W GN(4)[1](#mnote01), GEOG 160 GS(3) (Sem: 3-4)
CED 201(3)[1](#mnote01), GEOSC 303(3) (Sem: 5-6)
E R M 412(3) [1](#mnote01), E R M 413W(3) [1](#mnote01) (Sem: 7-8)

ADDITIONAL COURSES (8-10 credits)
MATH 111 GQ(2) or MATH 141 GQ(4) (Sem: 1-2)
Select 6 credits from E R M 430(3)[1](#mnote01), E R M 431(3) [1](#mnote01), E R M 432(3)[1](#mnote01), E R M 433(3) [1](#mnote01), E R M 435(3) [1](#mnote01) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (24 credits)
Select 3 credits in ecology (Sem: 5-6)
Select 18 credits of specialization/minor courses in consultation with adviser (Sem: 5-8)
Select 3 credits in communications (Sem: 7-8)

SOIL SCIENCE OPTION: (47-49 credits)

PRESCRIBED COURSES (14 credits)
SOILS 100(1) (Sem: 1-6)
SOILS 412W(3), SOILS 415(3)[1](#mnote01), SOILS 416(3)[1](#mnote01) (Sem:3-6)
SOILS 450(3), SOILS 490(1) (Sem: 5-8)

ADDITIONAL COURSES (15-17)
BIOL 110 GN(4) or BIOL 127 GN(3) (Sem:1-4)
GEOSC 001(3) or GEOSC 020 GN(3) (Sem: 1-4)
Select 3-4 credits from AGRO 028(3), BIOL 220W GN(4), FOR 203(3), HORT 101 GN(3), TURF 235(3) (Sem: 3-6)
Select 3 credits from E R M 433(3), SOILS 402(3), SOILS 419(3), SOILS 420(3) (Sem: 3-8)
Select 3 credits from SOILS 401(3), SOILS 405(3) GEOSC 452(3) (Sem: 3-8)

SUPPORTING COURSES AND RELATED AREAS (18 credits)

Select 18 credits of supporting courses in consultation with adviser. (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Fall Semester 2009

Blue Sheet Item #: 37-06-001

Review Date: 4/14/09

UCA Revision #1: 8/4/06

AG

Food Science

University Park, College of Agricultural Sciences (FD SC)

PROFESSOR STEPHANIE DOORES, *Program Coordinator*

Food science involves the application of science and technology to food product manufacture, storage, and distribution to consumers. Food scientists are especially concerned with food safety, nutritional values, managing food quality, food plant management, and development of new products and processes. They are employed by manufacturers and distributors of food products; by chemical, packaging, and other industries that supply goods and services; by colleges and universities in teaching and research; and by government agencies concerned with food regulations and the health and well-being of the general public.

Students must complete at least one 3-credit writing-intensive course, selected from "W" courses offered in the major or college of enrollment, 3 credits of United States Cultures courses, and 3 credits of International Cultures courses prior to graduation.

For the B.S. degree in Food Science, a minimum of 128 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(18 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 10 credits

REQUIREMENTS FOR THE MAJOR: 91 credits
(This includes 18 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GWS courses.)

PRESCRIBED COURSES (64 credits)
BIOL 011 GN(3), BIOL 012 GN(1), CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3),

CHEM 113 GN(1), FD SC 200(3) [1](#mnote01) (Sem: 1-2)
B M B 211(3), FD SC 201(1) [1](#mnote01), MICRB 201(3), MICRB 202(2), PHYS 250 GN(4) (Sem: 3-4)
B M B 212(1), FD SC 400(4) [1](#mnote01), FD SC 405(3)[1](#mnote01), FD SC 406(3)[1](#mnote01), FD SC 408(2)[1](#mnote01), FD SC 409W(3)[1](#mnote01), FD SC 410(3)[1](#mnote01), STAT 250 GQ(3) (Sem: 5-6)
FD SC 411(2), FD SC 413(3), FD SC 414(3), FD SC 415(3), FD SC 430(3), FD SC 490(1) (Sem: 7-8)

ADDITIONAL COURSES (13-15 credits)
MATH 110 GQ(4) or MATH 140 GQ(4) (Sem: 1-2)
CHEM 202(3), CHEM 203(3); or CHEM 210(3), CHEM 212(3), CHEM 213(2) (Sem: 3-4)
ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (12-14 credits)
To reflect the student's career interests, select 12-14 credits from department list or in consultation with adviser (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Spring Semester 2009

Blue Sheet Item #: 37-01-001

Review Date: 8/26/08

01/19/00 (General Education information updated)

UCA Revision #1: 8/4/06

AG

Forest Science

University Park, College of Agricultural Sciences (FORSC)

JAMIE MURPHY, *Instructor, Program Coordinator*

The mission of the B.S. program in Forest Science is to help students develop the knowledge, skills, and professional ethics for understanding and managing forest ecosystems and living as responsible members of society.

The Forest Science major provides for the education necessary for students to pursue professional careers in one of the following options: (1) Forest Biology, (2) Forest Management, (3) Urban Forestry, and (4) Watershed Management. These options also will help prepare students for graduate studies in continuing professional education.

FOREST BIOLOGY OPTION: This option provides a strong background in the biological and ecological aspects of contemporary forestry and establishes a sound foundation for professional employment and graduate-level study in forest and environmental sciences.

FOREST MANAGEMENT OPTION: This option provides professional training in the management of forest lands consistent with the needs of ownership objectives. Employment opportunities include forest management positions with public agencies, industry, and private consulting.

URBAN FORESTRY OPTION: This option helps prepare students to manage community

trees and green spaces. It emphasizes technical expertise, communication abilities, and skills for working with diverse people. Employment opportunities include municipalities, arboricultural companies, utilities, and government agencies.

WATERSHED MANAGEMENT OPTION: This option focuses on water resources and the integrated management of natural resources with emphasis on water. Graduates qualify for federal employment as hydrologists and for water-related careers in municipal watershed management, state and local government, and environmental/engineering consulting.

For the B.S. degree in Forest Science, a minimum of 127 credits is required for the Forest Biology, Forest Management, and Urban Forestry options, and a minimum of 120 credits for the Watershed Management option. Students should be aware that completion of the Forest Science degree in four years requires enrollment at the University Park Campus beginning the fall semester of the sophomore year.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(21-24 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 3 credits

REQUIREMENTS FOR THE MAJOR: 96-100 credits
(This includes 21-24 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3-6 credits of GS courses; 3 credits of GWS courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 40 credits

PRESCRIBED COURSES (27 credits)
BIOL 110 GN(4), CHEM 110 GN(3), CHEM 111 GN(1), ECON 002 GS(3) (Sem: 1-2)
FOR 200W(3), FOR 203(3) **[1](#mnote01)**, SOILS 101 GN(3), STAT 240 GQ(3), W P 203(1)**[1](#mnote01)** (Sem: 3-4)
FOR 308(3)**[1](#mnote01)** (Sem: 5-6)

ADDITIONAL COURSES (13 credits)
MATH 110 GQ(4), MATH 140 GQ(4), or MATH 140B GQ(4) (Sem: 1-2)
AEE 440(3), CAS 211(3), CAS 213(3), CAS 250(3), CAS 252(3), or CAS 352(3) (Sem: 5-6)
ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 5-6)
AEE 440(3), ENGL 215(3), ENGL 416(3-6), ENGL 418(3-6), or ENGL 419(3) (Sem: 7-8)

REQUIREMENTS FOR THE OPTION: 56-60 credits

FOREST BIOLOGY OPTION: (60 credits)

PRESCRIBED COURSES (45 credits)
BIOL 240W GN(4) (Sem: 1-2)
CHEM 202(3) (Sem: 3-4)
FOR 204(2), FOR 320(2), FOR 350(3), FOR 366(4) **[1](#mnote01)** (Sem: 3-6)
ENT 313(2), PPATH 318(2), W F S 209 GN(3) (Sem: 5-6)

FOR 409(2), FOR 410(3), FOR 421(3) [1](#mnote01), FOR 430(3), FOR 475(3)[1](#mnote01), FOR 480(3), FOR 494(3) (Sem: 5-8)

ADDITIONAL COURSES (6 credits)
AG BM 200(3) or MGMT 100(3) (Sem: 5-6)
FOR 455(3) or GEOG 362(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (9 credits)
Select 9 credits in consultation with adviser (Sem: 5-8)

FOREST MANAGEMENT OPTION: (60 credits)

PRESCRIBED COURSES (39 credits)
FOR 204(2), FOR 320(2), FOR 350(3), FOR 366(4) [1](#mnote01) (Sem: 3-6)
ENT 313(2), PPATH 318(2), W F S 209 GN(3) (Sem: 5-6)
FOR 421(3)[1](#mnote01), FOR 440(3), FOR 455(3), FOR 466W(3) [1](#mnote01), FOR 470(3), FOR 475(3), FOR 480(3) (Sem: 5-8)

ADDITIONAL COURSES (9 credits)
Select a minimum of 3 credits from GEOG 110 GN(3), GEOG 115 GN(3), GEOSC 002 GN(3), METEO 003 GN(3), PHYS 150 GN(3), PHYS 250 GN(4) (Sem: 3-4)
AG BM 200(3) or MGMT 100(3) (Sem: 7-8)
FOR 401(3) or FOR 416(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (12 credits)
In consultation with adviser, select 12 credits from department list approved for the option (Sem: 5-8)

URBAN FORESTRY OPTION: (60 credits)

PRESCRIBED COURSES (33 credits)
BIOL 240W GN(4) (Sem: 1-2)
ENT 313(2), FOR 204(2), FOR 350(3), FOR 366(4) [1](#mnote01), FOR 421(3), FOR 480(3), PPATH 318(2) (Sem: 3-4)
FOR 401(3)[1](#mnote01), HORT 138(3), HORT 408(4) (Sem: 5-8)

ADDITIONAL COURSES (3 credits)
FOR 495(1-6)[1](#mnote01) or FOR 496(1-18)[1](#mnote01) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (24 credits)
In consultation with adviser, select 24 credits from the following:
a. Select 3-6 credits from ENT 319(1), FOR 410(3), FOR 416(3), FOR 466W(3), FOR 470(3), and W F S 209 GN(3) (Sem: 5-8)
b. Select 2-3 credits from E R M 430(3), FOR 409(2), and FOR 430(3) (Sem: 5-8)
c. Select 3 credits from A S M 217(3) and FOR 475(3) (Sem: 5-8)
d. Select 3-6 credits from GEOG 122 GH(3), LARCH 003 GA(3), LARCH 060 GA;US;IL(3), and LARCH 241(3) (Sem: 5-8)
e. Select 3-6 credits from MGMT 100(3) or MGMT 341(3) and R SOC 305W(3) or R SOC 460(3) (Sem: 5-8)
f. Select 3-6 credits from B A 250(3), B LAW 243(3), and E R M 411(3) (Sem: 5-8)

WATERSHED MANAGEMENT OPTION: (56 credits)

PRESCRIBED COURSES (47 credits)
CHEM 202(3), MATH 111 GQ(2), METEO 003 GN(3), PL SC 001 GS(3) (Sem: 1-2)
GEOSC 001(3), PHYS 250 GN(4), PHYS 251 GN(4) (Sem: 3-4)
BIOL 220W(3) (Sem: 4-6)
A S M 327(3), W F S 435(3) [1](#mnote01) / E R M 435(3) [1](#mnote01), GEOSC 452(3)[1](#mnote01), MICRB 201(3), SOILS 422(3) (Sem: 5-8)

FOR 410(3), FOR 470(3) [1](#mnote01) , FOR 471(1) (Sem: 7-8)

ADDITIONAL COURSES (9 credits)
B LAW 243(3), E R M 411(3), PL SC 125(3), PL SC 417(3), or PL SC 419(3) (Sem: 5-6)
CED 201(3)/AG EC 201(3), E RRE 431W(3)/AG EC 431W(3), E RRE 429(3)/AG EC 429(3), ECON 302 GS(3), or ECON 428(3) (Sem: 7-8)
FOR 455(3), GEOG 362(3), GEOG 364(3), or SOILS 450(3) (Sem: 7-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2008

Blue Sheet Item #: 36-04-002

Review Date: 1/15/08

UCA Revision #1: 8/4/06

AG

Horticulture

University Park, College of Agricultural Sciences (HORT)

Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.

PROFESSOR CHARLES W. HEUSER, *Program Coordinator*

Horticulture is an applied biological science designed for students who are seeking careers in the management of public and commercial horticultural enterprises. Because of the rapidly changing needs of professionals in this field, Horticulture combines the application of science and technology to achieve its educational goals. Horticulture provides students maximum flexibility in selecting a program of study suited to their needs and professional goals. Students can emphasize floriculture (greenhouse production or floral retail), olericulture (vegetable crops), ornamental horticulture (herbaceous and woody perennials), and pomology (fruit culture). Programs of study in the disciplines of plant breeding, plant nutrition, and horticultural physiology are also available .

Graduates are employed as commercial growers of fruit, vegetable, nursery, or greenhouse crops; as managers of retail enterprises or public and private gardens; in production and quality control, or as field supervisors in the food processing industries; in federal and state inspection services; in crop consulting; in secondary level teaching; or in sales and service work for seed, plant materials, agricultural chemicals, and other related businesses. By selection of the Science Option, students can prepare for graduate study leading to careers in research, teaching, and/or extension in horticulture and related plant sciences.

BUSINESS/PRODUCTION OPTION:
This option is focused on preparing students to enter the horticultural industry by providing a broad background in courses related to horticultural business and production and physiology of horticultural crops. In addition courses in pest management and business are required.

SCIENCE OPTION:
This option provides students with a stronger basic science background in addition to the

broad background in horticultural courses. This option is designed to prepare students for graduate study.

For the B.S. degree in Horticulture, a minimum of 123 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(18 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 2-10 credits

REQUIREMENTS FOR THE MAJOR: 86-94 credits
(This includes 18 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 58-62 credits

PRESCRIBED COURSES (42 credits)
CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3) (Sem: 1-4)
BIOL 110 GN(4) (Sem: 1-4)
ENT 313(2), SOILS 101 GN(3) (Sem: 5-6)
PPATH 405(3) (Sem: 7-8)
HORT 101 GN(3) **[1](#mnote01)** , HORT 202(3) **[1](#mnote01)** , HORT 232(3)**[1](#mnote01)** , HORT 315(3) **[1](#mnote01)** , HORT 390(1) **[1](#mnote01)** , HORT 402W(3), HORT 407(3), HORT 412W(3) **[1](#mnote01)** , HORT 490(1)**[1](#mnote01)** (Sem: 1-8)

ADDITIONAL COURSES (16-20 credits)
Select 3-5 credits from MATH 022 GQ(3), MATH 026 GQ(3), MATH 030 GQ(3), MATH 040 GQ(5), MATH 041 GQ(3), MATH 110 GQ(4), MATH 111 GQ(2), MATH 140 GQ(4), MATH 141 GQ(4) (Sem: 1-2)
Select 3-4 credits from STAT 200 GQ(4) or STAT 240 GQ(3) (Sem: 3-4)
Select 3 credits from AG BM 101 GS(3), ECON 002 GS(3), ECON 004 GS(3), or ECON 014 GS(3) (Sem: 3-4)
Select 6-7 credits from HORT 408(4), HORT 431(3), HORT 432(3), HORT 433(3), HORT 450(3), HORT 453(3) (Sem: 7-8)
Select 1 credit from HORT 495(1) or HORT 496(1) (Sem: 7-8)

REQUIREMENTS FOR THE OPTION: 28-32 credits

BUSINESS/PRODUCTION OPTION: (28-31 credits)

PRESCRIBED COURSES (13 credits)
HORT 420(3), HORT 445(3), HORT 455(3) (Sem: 5-8)
ENT 314(1), ENT 457(3) (Sem: 7-8)

ADDITIONAL COURSES (15-18 credits)
AGRO 438(4) or HORT 238(3) (Sem: 5-8)
Select 9-10 credits from AG 301W(3), AG BM 200(3), AG BM 407(3), B LAW 243(3), FIN

100(3), MKTG 220(3), MKTG 221(3), SPAN(4) (Sem: 5-8)
Select 3 credits from HORT 131(3), HORT 137(3), HORT 138(3), HORT 431*(3), HORT 432*(3), HORT 433*(3) (Sem: 5-8)
**Student cannot use the same course more than once as an additional course.*

SCIENCE OPTION: (29-32 credits)

PRESCRIBED COURSES (14 credits)
CHEM 202(3), BIOL 230W GN(4), BIOL 240W GN(4), BIOL 441(3) (Sem: 5-8)

ADDITIONAL COURSES (15-18 credits)
Select 6-7 credits from B M B 211(3) or B M B 251(3); PHYS 250 GN(4), PHYS 251 GN(4), or BIOL 222(3) (Sem: 5-8)
Select 9-11 credits from BIOL 407(3), BIOL 414(3), BIOL 431(4), HORT 420(3), HORT 440W(3), HORT 444(4), HORT 445(3), HORT 459(3) (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2007

Blue Sheet Item #: 35-05-001

Review Date: 3/6/07

UCA Revision #1: 8/8/06

AG

Immunology and Infectious Disease

University Park, College of Agricultural Sciences (IID)

PROFESSOR JAMES ENDRES HOWELL, *Program Coordinator*

Immunology is the study of how animals and humans protect themselves from pathogens. Understanding basic mechanisms of immunity provides insights into how blood cells develop and how pathogens are recognized and attacked. Furthermore, understanding the concepts behind immunology is necessary for drug and vaccine design. Dysregulation of the processes that regulate immunity can contribute to uncontrolled inflammation, tissue destruction, autoimmunity, immunodeficiencies, leukemia and related cancers. Immunology includes a broad range of disciplines including but not limited to microbiology, virology, animal health, genetics, biochemistry, molecular and cell biology. Students enrolled in the Immunology and Infectious Disease Major will develop and understanding of normal immune responses to bacterial, fungal, and viral agents and appreciate the potential pathological outcomes of these responses. Students will learn about events that shape the immune response; the general biology of pathogens and the mechanisms by which they cause disease. In addition, basic skills in microbiology, molecular biology and biochemistry will be acquired. Students completing a B.S. degree in Immunology and Infectious Disease will be well prepared for veterinary, medical or other professional schools, Ph.D. graduate training in a wide variety of areas including immunology, microbiology, virology, molecular medicine, animal science, molecular biology and biochemistry or highly competitive jobs as research technicians, laboratory assistants or sales representatives with a pharmaceutical company.

In order to be eligible for entrance to the Immunology and Infectious Disease major, a student must have: (1) attained at least a 2.00 cumulative grade point average and (2)

completed BIOL 110 GN(4), BIOL 230W(4), CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3), CHEM 113 GN(1), MATH 140 GQ(4), MATH 141 GQ(4) and earned a grade of C or better in each of these courses

For the B.S. degree in Immunology and Infectious Disease, a minimum of 124 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(18 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection, or REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 7-10 credits

REQUIREMENTS FOR THE MAJOR: 87-90 credits
(This includes 18 credits of GENERAL EDUCATION courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses.)

PRESCRIBED COURSES (69 credits)
B M B 401(3), B M B 402(3), BIOL 110 GN(4), BIOL 220W GN(4), BIOL 230W GN(4), CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3), CHEM 113 GN(1), CHEM 210(3), CHEM 212(3), CHEM 213(2), MATH 140 GQ(4), MATH 141 GQ(4), MICRB 201(3), MICRB 202(2), MICRB 410(3) **[1](#mnote01)** , PHYS 250 GN(4), PHYS 251 GN(4), VB SC 211 GN(3) **[1](#mnote01)** , VB SC 444(3) **[1](#mnote01)** , VB SC 445(3), VB SC 448W(3) (Sem: 1-8)

ADDITIONAL COURSES (9-12 credits)
Select 3 credits from AG BM 101 GS(3), ECON 002 GS(3), ECON 004 GS(3) (Sem: 1-2)
Select 2-4 credits AG 200A(2), AG 200B(2), STAT 200 GQ(4), STAT 240 GQ(3), STAT 250 GQ(3) (Sem: 3-4)
Select 4-5 credits VB SC 418(2) **[1](#mnote01)** , V SC/MICRB/B M B 432(3) **[1](#mnote01)** , V SC/MICRB 435(2) **[1](#mnote01)** (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS (9 credits)
Select 9 credits of 400-level courses from departmental lis**[1](#mnote01)** (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Spring Semester 2006

Blue Sheet Item #: 34-01-005

Review Date: 10/10/06

UCA Revision #1: 8/8/06

HH

Landscape Contracting

University Park, College of Agricultural Sciences (LSCPE)

PROFESSOR DAN T. STEARNS, Program Coordinator

Landscape contracting involves constructing, establishing, and maintaining landscapes from small residential projects to large commercial and industrial projects, as well as producing plans for small-scale residential and commercial sites. Students develop skills in construction, site design, plant material usage, plant establishment, and landscape maintenance. Students are also educated in areas such as graphics, surveying, soils, turfgrass management, weed and pest management, and in business operations.

Students are encouraged to obtain on-the-job experience in landscape contracting by working with a landscape maintenance or construction firm, or other related business. Credits for this experience are available for those who choose to enroll in an internship.

A wide variety of opportunities exist for landscape contracting graduates. They may be employed by design/build firms, landscape management firms, nurseries, or garden centers. Others may choose to work for municipalities, golf courses, parks, or botanical gardens.

DESIGN/BUILD OPTION: This option focuses on the development of skills in the planning and implementation of landscape projects. Employment opportunities exist with landscape contracting companies, irrigation companies, and retail centers.

MANAGEMENT OPTION: This option provides professional education in the management of landscapes. Employment opportunities include positions with landscape management companies and golf courses.

For the B.S. degree in Landscape Contracting, a minimum of 123 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(21 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 3-15 credits

REQUIREMENTS FOR THE MAJOR: 84-96 credits
(This includes 21 credits of General Education courses: 3 credits of GWS courses; 3 credits of GA courses; 3 credits of GQ courses; 9 credits of GN courses; 3 credits of GS courses)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 70-71 credits

PRESCRIBED COURSES (54 credits)
HORT 410W(3), HORT 468(2) **[1](#mnote01)** , LARCH 060 GA;US;IL(3), MATH 026 GQ(3) (Sem: 1-2)
A S M 217(3), ACCTG 211(4), B A 250(3), B LAW 243(3), CHEM 110 GN(3), ENGL 202D GWS(3), GEOSC 020 GN(3), HORT 101 GN(3) **[1](#mnote01)** , HORT 120(2)**[1](#mnote01)** , HORT 131(3) **[1](#mnote01)** , HORT 137(3) **[1](#mnote01)** , HORT 138(3) **[1](#mnote01)** , HORT 408(4) **[1](#mnote01)** (Sem: 5-6)

SOILS 101 GN(3) (Sem: 7-8)

ADDITIONAL COURSES (16-17 credits)
AG BM 101 GS(3), ECON 002 GS(3), ECON 004 GS(3), or ECON 014 GS(3) (Sem: 3-4)
BIOL 110 GN(4) or BIOL 127 GN(3) (Sem: 3-4)
SPAN 001(4) or SPAN 002(4) or SPAN 105(4) (Sem: 3-4)
MKTG 220(3), or AG BM 220(3) (Sem: 5-6)
TURF 100(3) or TURF 235(3) (Sem: 5-6)

REQUIREMENTS FOR THE OPTION: 14-25 credits

DESIGN/BUILD OPTION: (25 credits)

PRESCRIBED COURSES (23 credits)
ART 020 GA(3), EDSGN 010(1), HORT 220(3) **[1](#mnote01)** (Sem: 3-4)
HORT 269(3) **[1](#mnote01)**, HORT 464(4) **[1](#mnote01)** (Sem: 5-6)
HORT 368(4) **[1](#mnote01)**, HORT 466(5) **[1](#mnote01)** (Sem: 7-8)

ADDITIONAL COURSES (2 credits)
Select at least 2 credits from ENT 313(2), ENT 314(1), HORT 238(3), PPATH 318(2) (Sem: 5-6)

MANAGEMENT OPTION: (14 credits)

PRESCRIBED COURSES (14 credits)
ENT 313(2), ENT 314(1), HORT 238(3) **[1](#mnote01)**, HORT 250(3) **[1](#mnote01)**, SOILS 401(3) (Sem: 7-8)
PPATH 318(2) (Sem: 7-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2009

Blue Sheet Item #: 37-05-002

Review Date: 2/24/09

UCA Revision #1: 8/8/06

AG

Toxicology

University Park, College of Agricultural Sciences (TOX)

PROFESSOR JAMES ENDRES HOWELL, *Program Coordinator*

Toxicology addresses adverse effects of chemicals on animals and humans and includes exposure assessment, hazard identification, dose-response analysis, and risk characterization. This discipline relies on cutting-edge biotechnological approaches to gain insight into drug and toxicant action at the molecular level. Students enrolled in the Toxicology program will develop an understanding of the principles by which chemicals affect the health of humans and animals either adversely, as toxic agents, or beneficially, as therapeutic agents. Students will learn about: 1) mechanisms of action of drugs and toxicants on organ systems of the body; 2) general principles for assessing the safety of chemicals and therapeutic efficacy of drugs; and 3) state-of-the-art molecular, biological, and genetic approaches to understanding drugs, toxicants, and disease through a

combination of laboratory and lecture experiences. The B.S. degree in Toxicology provides a strong foundation for graduate work leading to a Ph.D. in most biomedical fields. Students may choose to pursue a Ph.D. degree in Pharmacology, Toxicology, Biochemistry, Physiology, Pathobiology, Oncology, or Molecular Biology. Alternatively, students prepare for employment as research technicians, drug/toxicant specialists, or pharmaceutical sales representatives.

For the B.S. degree in Toxicology, a minimum of 124 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(15 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in ELECTIVES, GENERAL EDUCATION course selection, or REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 12-15 credits

REQUIREMENTS FOR THE MAJOR: 79-83 credits
(This includes 15 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses.)

PRESCRIBED COURSES (52 credits)
BIOL 110 GN(4), CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3), CHEM 113 GN(1), MATH 140 GQ(4), MATH 141 GQ(4) (Sem: 1-2)
PHYS 250 GN(4), PHYS 251 GN(4) (Sem: 3-6)
BIOL 220W GN(4), BIOL 230W GN(4), BIOL 240W GN(4) (Sem: 3-6)
VB SC 330(3)**[1](#mnote01)** (Sem: 5-6)
E R M 431(3) **[1](#mnote01)**, VB SC 430(3)**[1](#mnote01)**, VB SC 433(3)**[1](#mnote01)** (Sem 7-8)

ADDITIONAL COURSES (18-21 credits)
Select 6-8 credits from CHEM 202(3), CHEM 203(3); or CHEM 210(3), CHEM 212(3), CHEM 213(2) (Sem: 3-6)
Select 3-4 credits from STAT 200 GQ(4) or STAT 250 GQ(3) (Sem: 3-4)
Select 3 credits from AN SC 423(3) or BIOL 472(3) (Sem: 5-6)
Select 6 credits from B M B 211(3), B M B 212(1), B M B 221(2); or B M B 401(3), B M B 402(3) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (9 credits)
Select 9 credits of 400-level courses from department list (must include 6 credits of a grade of C or better**[1](#mnote01)**) (Sem: 7-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2008

Blue Sheet Item #: 36-04-003

Review Date: 1/15/08

UCA Revision #1: 8/14/06

AG

Turfgrass Science

University Park, College of Agricultural Sciences

PROFESSOR A. J. TURGEON, *Program Coordinator (TURF)*

This major provides an integrated program of study that includes basic and applied sciences, business management courses and an internship to prepare students for careers in turfgrass management and related areas. By carefully selecting supporting courses and electives, students can adapt the program to meet a variety of professional interests and educational needs.

Employment opportunities include golf course maintenance, professional lawn care, grounds maintenance, sod production, sales and service, athletic field maintenance, and research technician.

With appropriate selection of science courses, students can prepare for graduate study leading to careers in teaching, research, and extension.

A student wishing to transfer into the Turfgrass Science program must have completed CHEM 101 GN(3) or CHEM 110 GN(3) and CHEM 202(3) for a total of six credits and received a grade of C or better in each course prior to declaring the major.

For the B.S. degree in Turfgrass Science, a minimum of 120 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(18 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in SUPPORTING COURSES AND RELATED AREAS course selections) (Sem: 1)

UNITED STATES CULTURES AND INTERCULTURAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selections) (Sem: 1-8)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR) (Sem: 7-8)

ELECTIVES: 4 credits

REQUIREMENTS FOR THE MAJOR: 89 credits
(This includes 18 credits of General Education courses: 3 credits of GWS courses; 6 credits of GQ courses; 9 credits of GN courses.)

PRESCRIBED COURSES (53 credits)
BIOL 011 GN(3), BIOL 012 GN(1), BIOL 127 GN(3), CHEM 202(3), CMPSC 203 GQ(4), MATH 021 GQ(3), METEO 101 GN(3) (Sem: 1-4)
SOILS 101 GN(3)[1](#mnote01), TURF 230(1)[1](#mnote01), TURF 235(3)[1](#mnote01), TURF 435(4)[1](#mnote01), TURF 495(3)[1](#mnote01) (Sem: 3-4)

ENT 317(3) [1](#mnote01) , PPATH 412(3) [1](#mnote01) , TURF 238(3) [1](#mnote01) , TURF 434(3) [1](#mnote01) (Sem: 5-6)
TURF 425(3) [1](#mnote01) , TURF 436W(3) [1](#mnote01) , TURF 490(1) [1](#mnote01) (Sem: 6-8)

ADDITIONAL COURSES (6 credits)
CHEM 101 GN(3) or CHEM 110 GN(3) (Sem: 1-4)
ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (30 credits)
Select 15 credits from department professional agriculture list (Sem: 1-8)
Select 15 credits from department professional management and economics list (Sem: 1-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2005

Blue Sheet Item #: 33-04-003

Review Date: 6/14/07

UCA Revision #1: 8/14/06

Comments (http://www.psu.edu/bulletins/bluebook/contact)

AG

Veterinary and Biomedical Sciences

University Park, College of Agricultural Sciences (BSC)

PROFESSOR LESTER C. GRIEL Jr., *Program Coordinator*

This major provides a strong background in those biological and physical sciences underlying contemporary veterinary science and establishes a sound foundation for graduate-level study in veterinary and related biomedical disciplines. The student has the option to focus their area of study by selecting supporting courses in a variety of areas.

The mission of the Veterinary and Biomedical Sciences major is to prepare students for admission to veterinary school and/or entry into graduate programs or employment in veterinary and biomedical research and development. Students may prepare for graduate programs in disciplines such as genetics, nutrition, microbiology, animal sciences, physiology, biochemistry, or others.

For the B.S. degree in Veterinary and Biomedical Sciences, a minimum of 124 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 46 credits
(18 of these 46 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in ELECTIVES, GENERAL EDUCATION course selection, or REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 7-9 credits

REQUIREMENTS FOR THE MAJOR: 87-89 credits
(This includes 18 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses.)

PRESCRIBED COURSES (56 credits)
BIOL 110 GN(4), CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3), CHEM 113 GN(1), MATH 140 GQ(4), MATH 141 GQ(4) (Sem: 1-4)
AN SC 001(4)**[1](#mnote01)** , PHYS 250 GN(4), PHYS 251 GN(4), STAT 250 GQ(3) (Sem: 3-4)
AN SC 301(3)**[1](#mnote01)** , BIOL 222(3)**[1](#mnote01)** , MICRB 201(3), MICRB 202(2) (Sem: 5-6)
VB SC 211 GQ(3), VB SC 303(3) **[1](#mnote01)** , VB SC 421(4) (Sem: 4-8)

ADDITIONAL COURSES (22-24 credits)
Select 4 credits from BIOL 220W GN(4), BIOL 230W GN(4), or BIOL 240W GN(4) (Sem: 3-4)
Select 6-8 credits from CHEM 202(3), CHEM 203(3); or CHEM 210(3), CHEM 212(3), CHEM 213(2) (Sem: 3-4)
Select 3 credits from AN SC 423(3) or BIOL 472(3) (Sem: 5-6)
Select 3 credits from AG BM 101 GS(3), ECON 002 GS(3), or ECON 004 GS(3) (Sem: 1-3)
Select 6 credits from B M B 211(3), B M B 212(1), B M B 221(2); or B M B 401(3), B M B 402(3) (Sem: 5-6)

SUPPORTING COURSES AND RELATED AREAS (9 credits)**[1](#mnote01)**
Select 9 credits of 400-level courses from department list (must include 3 credits of a grade of C or better) (Sem: 7-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2008

Blue Sheet Item #: 36-05-001

Review Date: 2/26/08

UCA Revision #1: 8/2/06

AG

Wildlife and Fisheries Science

University Park, College of Agricultural Sciences (W F S)

JAMIE MURPHY, *Instructor, Program Coordinator*

The purpose of the Wildlife and Fisheries Science major is to develop the knowledge, skills, and professional ethics of undergraduates interested in the conservation and management of fish and wildlife and their environments. The curriculum is designed to provide a

broad-based science background that incorporates natural resource management principles that prepare our students for a diverse array of opportunities such as graduate school, natural resource management agencies, consulting firms, non-profits, etc. Students can choose from two options: Wildlife option and Fisheries option. Each option enables students to gain greater depth of knowledge in one area of the discipline. Coursework required for the Wildlife option meets The Wildlife Society's requirements for professional certification, and coursework required for the Fisheries option meets the American Fisheries Society's requirements for professional certification.

For the B.S. in Wildlife and Fisheries Science, a minimum of 120 credits is required for the Wildlife option and a minimum of 122 credits is required for the Fisheries option.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(21 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 3-9 credits

REQUIREMENTS FOR THE MAJOR: 87-95 credits
(This includes 21 credits of General Education courses: 9 credits of GN courses; 6 credits of GQ courses; 3 credits of GS courses; 3 credits of GWS courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 69-72 credits

PRESCRIBED COURSES (45 credits)
BIOL 110 GN(4), BIOL 220W GN(4) **[1](#mnote01)** , CHEM 110 GN(3), CHEM 111 GN(1) (Sem: 1-4)
BIOL 240W GN(4), CHEM 202(3), PHYS 250 GN(4), SOILS 101 GN(3), W F S 209 GN(3)**[1](#mnote01)** (Sem: 3-4)
ECON 004 GS(3), W F S 300(2) **[1](#mnote01)** , W F S 301(2)**[1](#mnote01)** , W F S 310(3)**[1](#mnote01)** (Sem: 5-6)
W F S 446(3), ENGL 202C GWS(3) (Sem: 7-8)

ADDITIONAL COURSES (18-21 credits)
MATH 110 GQ(4)**[1](#mnote01)** or MATH 140 GQ(4)**[1](#mnote01)** ; MATH 111 GQ(2) or MATH 141 GQ(4) (Sem: 1-2)
AN SC 322(3), BIOL 133 GN(3), BIOL 222(3), or BIOL 230W GN(4); STAT 240 GQ(3) or STAT 301 GQ(3) (Sem: 3-4)
FOR 350(3) or STAT 460(3) (Sem: 5-6)
AEE 440(3), CAS 211(3), ENGL 416(3), or ENGL 418(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (6 credits)
Select 6 credits in natural resource economics, policy, planning, law, administration, or human dimensions from departmental list (Sem: 5-8)

REQUIRMENTS FOR THE OPTION: 18-23 credits

FISHERIES OPTION: (22-23 credits)

PRESCRIBED COURSES (10 credits)
W F S 452(2), W F S 453(2) (Sem: 5-6)
W F S 410(3), W F S 463W(3) (Sem: 5-8)

ADDITIONAL COURSES (12-13 credits)
BIOL 141 GN(3), BIOL 142(1); or BIOL 446(3), or AN SC 201(4) (Sem: 5-6)
W F S 407(3), W F S 408(3), or W F S 447W(3) (Sem: 5-8)
ENT 425(3), FOR 470(3), W F S 422(3);W F S 435(3)/E R M 435(3) (Sem: 5-8)
GEOG 160 GS(3), GEOG 363(3), GEOSC 303(3), GEOSC 340(3), GEOSC 412(3), GEOSC 440(3), or GEOSC 452(3) (Sem: 7-8)

WILDLIFE OPTION: (18-19 credits)

PRESCRIBED COURSES (12 credits)
FOR 203(3) (Sem: 3-4)
W F S 407(3), W F S 408(3) (Sem: 5-6)
W F S 447W(3) (Sem: 7-8)

ADDITIONAL COURSES (6-7 credits)
W F S 406(1) or W F S 409(1) (Sem: 5-6)
W F S 410(3), W F S 422(3), W F S 452(2), W F S 453(2), or W F S 463W(3) (Sem: 5-8)
BIOL 414(3), FOR 308(3), HORT 101 GN(3), HORT 138(3), or HORT 445(3) (Sem: 7-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2008

Blue Sheet Item #: 36-04-004

Review Date: 1/15/08

UCA Revision #1: 8/14/06

AG

Wood Products

University Park, College of Agricultural Sciences (W P)

JAMIE MURPHY, *Instructor, Program Coordinator*

The primary purpose of this major is to help prepare students for careers in wood products industry. Students can choose from two options: Wood Products Business and Marketing and Wood Products Processing and Manufacturing. The options are designed to give the student flexibility for a science or business/marketing emphasis supported by a general education in communication, natural science, social science and humanities, and quantification.

Proper selection in elective courses enables the student to be prepared for employment in various aspects of wood products business management or marketing, process and product quality control, or research and development. The wide scope of the wood industry--from harvesting to the use of wood, fiber, and chemical products--presents a broad spectrum of employment opportunities. Within the employment spectrum are jobs related to roundwood processing to lumber and plywood, drying and protection of wood and fiber products, adhesives and coatings, reconstituted wood composites, paper manufacture, board products, and construction and housing.

For the B.S. degree in Wood Products, a minimum of 125 credits is required. Students should be aware that completion of the Wood Products degree in four years is difficult if they are not at the University Park campus beginning the fall semester of the sophomore year.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 45 credits
(12-19 of these 45 credits are included in the REQUIREMENTS FOR THE MAJOR)
(See description of General Education in this bulletin.)

FIRST-YEAR SEMINAR:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

UNITED STATES CULTURES AND INTERNATIONAL CULTURES:
(Included in ELECTIVES or GENERAL EDUCATION course selection)

WRITING ACROSS THE CURRICULUM:
(Included in REQUIREMENTS FOR THE MAJOR)

ELECTIVES: 2-6 credits

REQUIREMENTS FOR THE MAJOR: 86-97 credits
(For the Business and Marketing option this includes 12 credits of General Education courses: 3 credits of GWS courses; 3 credits of GS courses; 6 credits of GQ courses. For the Processing and Manufacturing option this includes 19 credits of General Education courses: 3 credits of GWS courses, 3 credits of GS courses, 6 credits of GQ courses, and 7 credits of GN courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 41-43 credits

PRESCRIBED COURSES (26 credits)
MATH 110 GQ(4), MATH 111 GQ(2) (Sem: 1-4)
FOR 203(3) **[1](#mnote01)** , W P 200W(3) **[1](#mnote01)** , W P 411(4) (Sem: 3-4)
W P 203(1) **[1](#mnote01)** (Sem: 3-6)
W P 417(4) **[1](#mnote01)** , W P 437W(4) **[1](#mnote01)** , W P 490(1) **[1](#mnote01)** (Sem: 5-8)

ADDITIONAL COURSES (15-17 credits)
Select 3-4 credits from CMPSC 101 GQ(3), CMPSC 103 GQ(4), CMPSC 201 GQ(3), CMPSC 202 GQ(3), or CMPSC 203 GQ(4) (Sem: 3-4)
Select 3-4 credits of STAT 200 GQ(4), STAT 240 GQ(3), STAT 250 GQ(3), or STAT 301 GQ(3) (Sem: 3-6)
ENGL 202C GWS(3) or ENGL 202D GWS(3) (Sem: 3-6)
CAS 211(3) or ENGL 215(3) (Sem: 3-6)
ECON 002 GS(3), ECON 004 GS(3), or ECON 014 GS(3) (Sem: 3-6)

REQUIREMENTS FOR THE OPTION: 45-54 credits

WOOD PRODUCTS BUSINESS AND MARKETING OPTION: (45-47 credits)

PRESCRIBED COURSES (8 credits)
W P 400(2), W P 416(3), W P 435(3) (Sem: 5-8)

ADDITIONAL COURSES (24 credits)
Select 24 credits from ACCTG 211(4); AG BM 101 GS(3) or ECON 002 GS(3); B A 250(3), B LAW 243(3), ECON 004 GS(3); ECON 315 GS(3) or LER 100 GS(3); FIN 100(3), I B 303 IL(3) or ECON 333 GS(3); I E 302(3), MGMT 100(3), MKTG 221(3), PSYCH 100 GS(3), SCM 301(3), any GQ B A course or CMPSC 203 GQ(4), or any additional W P course (2-3) (Sem:

5-8)

SUPPORTING COURSES AND RELATED AREAS (13-15 credits)
Select 13-15 credits in consultation with adviser from department list.
(Students may apply 3 credits of ROTC.)

WOOD PRODUCTS PROCESSING AND MANUFACTURING OPTION: (52-54 credits)

PRESCRIBED COURSES (21 credits)
CHEM 110 GN(3), CHEM 111 GN(1), CHEM 112 GN(3) (Sem: 1-4)
W P 337(2), W P 412(3), W P 413(3), W P 418(4), W P 423(2) (Sem: 5-8)

ADDITIONAL COURSES (17-19 credits)
Select 17-19 credits from BIOL, BI SC (GN), PHYS (GN) biochemistry or organic chemistry, and any additional W P courses (Sem: 1-4)

SUPPORTING COURSES AND RELATED AREAS (14 credits)
Select 14 credits in consultation with adviser from department list.
(Students may apply 3 credits of ROTC.) (Sem: 5-8)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2008

Blue Sheet Item #: 36-04-005

Review Date: 1/15/08

UCA Revision #1: 8/14/06
UCA Revision #2: 7/30/07

AG

Associate Degrees

Agricultural Business

Berks College
University Park, College of Agricultural Sciences (2 AGB)

Not all options are available at every campus. Contact the campus you are interested in attending to determine which options are offered.

PROFESSOR JANELLE B. LARSON, *in charge, Berks College*
PROFESSOR JAMES W. DUNN, *Program Coordinator, College of Agricultural Sciences, Penn State University Park*

The Agricultural Business major helps prepare students for employment in commercial agriculture and businesses serving agriculture. Five options allow students to specialize in either Crop or Animal Production, Food Technology, Horticulture, or General Agribusiness Management, which provides training in management, business organization, and marketing.

The first two semesters are offered at selected locations, where students fulfill basic course requirements in accounting, business, English, and natural and social sciences. The second year at the University Park campus provides course work in livestock and crop production, food technology, horticulture, management, and agribusiness. Each option allows the student a choice of courses to satisfy special interests and needs. The Food

Technology and Horticulture options can be completed at both University Park and at Penn State Berks, although some course substitutions may be necessary, as not all courses listed below are offered at both campuses.

For the Associate in Science degree in Agricultural Business, a minimum of 63 credits is required depending on the option chosen.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 21 credits
(9 of these 21 credits are included in the REQUIREMENTS FOR THE MAJOR. Requirements for certain options also will fulfill other general education requirements.)
(See description of General Education in this bulletin.)

ELECTIVES: 3-5 credits

REQUIREMENTS FOR THE MAJOR: 45-48 credits
(This includes 9 credits of General Education courses: 6 credits of GWS courses; 3 credits of GS courses.)

COMMON REQUIREMENTS FOR THE MAJOR (ALL OPTIONS): 16 credits

PRESCRIBED COURSES (13 credits)
ENGL 015 GWS(3), CAS 100 GWS(3), ACCTG 211(4), AG BM 101 GS(3) **[1](#mnote01)** (Sem: 1-4)

ADDITIONAL COURSES (3 credits)
AG BM 200(3) **[1](#mnote01)** or MGMT 301(3) **[1](#mnote01)** (Sem: 1-2)

REQUIREMENTS FOR THE OPTION: 29-32 credits

ANIMAL PRODUCTION OPTION: (31-32 credits)

PRESCRIBED COURSES (13 credits)
AGRO 028(3), AN SC 201(4) **[1](#mnote01)**, A S M 101(3), SOILS 101 GN(3) (Sem: 1-4)

ADDITIONAL COURSES (6-7 credits)
B A 243(4) or B LAW 243(3) or AG 301W(3) or B A 241(2) and B A 242(2) (Sem: 3-4)
AG BM 102(3) or AG BM 220(3) or MKTG 220(3) or MKTG 221(3) (Sem: 3-4)

SUPPORTING COURSES AND RELATED AREAS (12 credits)
Select 12 credits in animal science from AN SC 100(3), AN SC 207(2), AN SC 208(1), AN SC 301(3), AN SC 305(3), AN SC 306(3), AN SC 308(4), AN SC 309(4), AN SC 310(3), AN SC 311(4), AN SC 322(3), AN SC 324(3), and AN SC 327(3) (Note: some courses may have biology and/or chemistry prerequisites.) (Sem: 3-4)

CROP PRODUCTION OPTION: (30-31 credits)

PRESCRIBED COURSES (12 credits)
A S M 101(3), AGRO 028(3) **[1](#mnote01)**, ENT 313(2) and ENT 316(1), SOILS 101 GN(3) (Sem: 3-4)

ADDITIONAL COURSES (6-7 credits)
B A 243(4) or B LAW 243(3) or AG 301W(3) or B A 241(2) and B A 242(2) (Sem: 3-4)

SUPPORTING COURSES AND RELATED AREAS (12 credits)
Select 12 credits from agronomy, agroecosystems science, horticulture or turfgrass science. (Note: some may have biology and/or chemistry or other prerequisites.) (Sem: 3-4)

FOOD OPTION: (29-30 credits)
(Note: some courses may have biology and/or chemistry prerequisites.)

PRESCRIBED COURSES (23 credits)
CHEM 110 GN(3), CHEM 111 GN(1), MICRB 106 GN(3), MICRB 107 GN(1), FD SC 200(3)[1](#mnote01), FD SC 201(1), FD SC 205(3), FD SC 206(3), MIS 204(2), NUTR 251 GHA(3) (Sem: 1-4)

ADDITIONAL COURSES (6-7 credits)
AG BM 102(3) or AG BM 220(3) or MKTG 220(3) or MKTG 221(3) (Sem: 3-4)
B A 243(4) or B LAW 243(3) or AG 301W(3) or B A 241(2) and B A 242(2) (Sem: 3-4)

GENERAL OPTION: (30-31 credits)

PRESCRIBED COURSES (15 credits)
AG BM 102(3), AG BM 106(3), AGRO 028(3), SOILS 101 GN(3), A S M 101(3) (Sem: 3-4)

ADDITIONAL COURSES (6-7 credits)
B A 243(4) or B LAW 243(3) or AG 301W(3) or B A 241(2) and B A 242(2) (Sem: 3-4)
AG BM 220(3)[1](#mnote01) or MKTG 220(3)[1](#mnote01), or MKTG 221(3) (Sem: 3-4)

SUPPORTING COURSES AND RELATED AREAS (9 credits)
Select 6 credits in agribusiness management or business (Sem: 3-4)
Select 3 credits in agronomy, animal science, agroecosystems science, horticulture, or other courses in agriculture. (Sem: 3-4)

HORTICULTURE OPTION: (30-31 credits)

PRESCRIBED COURSES (9 credits)
HORT 101 GN(3)[1](#mnote01), HORT 202(3), SOILS 101 GN(3) (Sem: 1-4)

ADDITIONAL COURSES (9-10 credits)
AG BM 102(3) or AG BM 220(3) or MKTG 220(3) or MKTG 221(3) (Sem: 3-4)
HORT 137(3) or HORT 138(3) (Sem: 3-4)
B A 243(4) or B LAW 243(3) or AG 301W(3) or B A 241(2) and B A 242(2) (Sem: 3-4)

SUPPORTING COURSES AND RELATED AREAS (12 credits)
Select 12 credits from horticulture, turfgrass science, agribusiness or business. (Note: some may have prerequisites.)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2006

Blue Sheet Item #: 34-03-001

Review Date: 6/9/08

UCA Revision #1: 8/2/06

AG

Forest Technology

University College: Penn State Mont Alto
University Park, College of Agricultural Sciences (2 FORT)

PROFESSOR CRAIG T. HOUGHTON, *in charge*

The objectives of the major are to train forestry field personnel in the technical aspects of evaluating, managing, and protecting forest resources. Laboratories held in the Michaux State Forest, adjacent to Penn State Mont Alto, stress field applications of classroom theory. Both written and oral communication skills are stressed in all courses. Graduates of the program are employed by private businesses including forestry consulting firms, sawmills, and other wood products manufacturers; public agencies including federal, state, and municipal forest resource management and recreation programs; urban tree service companies, pulp and paper manufacturers, surveying firms and landscaping firms, utility companies, and other businesses requiring personnel skilled in field inventory procedures, analysis, and presentation.

Some graduates transfer their credits to bachelor's degree programs such as forest science, wildlife and fisheries science, recreation and parks management, wood products, environmental resource management, soil science, biology, and business management.

For the Associate in Science degree in Forest Technology, a minimum of 67 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 21 credits
(See description of General Education in this bulletin.)

REQUIREMENTS FOR THE MAJOR: 46 credits

PRESCRIBED COURSES (40 credits)
FORT 100(1), FORT 105(3) **[1](#mnote01)** , FORT 120(2), FORT 150(3) **[1](#mnote01)** (Sem: 1)
FORT 110(3) **[1](#mnote01)** , FORT 130(2), FORT 140(3), FORT 160(3) **[1](#mnote01)** (Sem: 2)
FORT 170(3), FORT 175(1) (Sem: Summer)
FORT 200(1), FORT 220(4), FORT 230(2), MGMT 100W(3) (Sem: 3)
FORT 240(3), FORT 250(3) (Sem: 4)

ADDITIONAL COURSES (6 credits)
Select 6 credits from FORT 210(3), FORT 260(3), WILDL 101(3), or WILDL 207(3) (Sem: 3-4)

NOTE: BIOL 110(4), CHEM 110(3), and MATH 110(4) are recommended for students planning to continue in the Forest Science baccalaureate program.

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Fall Semester 2009

Blue Sheet Item #: 38-02-001

Review Date: 10/06/09

UCA Revision #1: 8/4/06

AG

Wildlife Technology

University College: Penn State DuBois
University Park, College of Agricultural Sciences (2 WLT)

PROFESSOR CHARLES P. SCHAADT, *in charge, Penn State DuBois*

The Wildlife Technology major helps prepare students in the techniques of wildlife management. Personnel trained in this field are needed to assist in the applied phases of natural resource management, wildlife biology, range management, and the care, maintenance, and propagation of animals. Graduates should be able to support professionals in wildlife biology, park managers, game refuge managers, and laboratory technicians in research.

For the Associate in Science degree in Wildlife Technology, a minimum of 66 credits is required.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

GENERAL EDUCATION: 21 credits
(See description of General Education in this bulletin.)

REQUIREMENTS FOR THE MAJOR: 45 credits

PRESCRIBED COURSES (45 credits)
FORT 150(3), FORT 160(3), ENGL 202C(3), WILDL 101(3) **[1](#mnote01)** , WILDL 103(3)**[1](#mnote01)** , WILDL 106(4) (Sem: 1-2)
AG 113(1), FOR 242(3), KINES 013 GHA(1), WILDL 204(4), WILDL 207(3), WILDL 208(3)**[1](#mnote01)** , WILDL 209(4), WILDL 211(4), WILDL 213(3) (Sem: 3-4)

[1] A student enrolled in this major must receive a grade of C or better, as specified in Senate Policy 82-44.

Last Revised by the Department: Summer Session 2007

Blue Sheet Item #: 35-05-002

Review Date: 3/6/07

AG

Minors

Agribusiness Management Minor

University Park, College of Agricultural Sciences (AG BM)

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (9 credits)
AG BM 102(3), AG BM 106(3), AG BM 200(3) (Sem: 2-6)

ADDITIONAL COURSES (9 credits)
Select 9 credits from AG 301W(3), AG BM 302(3), AG BM 308W(3), AG BM 320(3), AG BM 338(3), AG BM 407(3), AG BM 408(3), AG BM 420(3), AG BM 440(3), AG BM 460(3), and AG BM 495A(1-3) or AG BM 495B(1-3) (Sem: 5-8)

Last Revised by the Department: Fall Semester 2002

Blue Sheet Item #: 30-07-002

Review Date: 4/8/03

AG

Agricultural and Biological Engineering Minor

University Park, College of Agricultural Sciences
University Park, College of Engineering (A B E)

This minor provides students with an opportunity to apply engineering principles to agricultural and biological production and processing systems and to the management of our natural resources. Courses may be selected by students to gain a better understanding of soil conservation and water quality, food and biological process engineering, structures and their environments, power and machinery, or microbiological engineering.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18-20 credits

PRESCRIBED COURSES (3 credits)
B E 300(3) (Sem: 5-6)

ADDITIONAL COURSES (15-17 credits)
Select 5-6 credits from B E 301(3), B E 302(3), B E 303(2), B E 304(3), B E 305(3), B E 306(2), B E 307(2), B E 308(3) (Sem: 5-8)
Select 10-11 credits from one of the following areas; one course marked with * must be selected (Sem: 5-8)
(a) Power and Machinery Systems: B E 461(3)*, A S M 420(3), A S M 424(3), M E 431, M E 480(3)
(b) Biological Systems: B E 468(3)*, BIOE 401(3), CH E 438(3), CHEM 202(3), MICRB 201(3)
(c) Natural Resource Systems: B E 467(3)*, B E 477(3), C E 370(3), C E 371(3), C E 461(3), C E 471(3)
(d) Food Process Systems: B E 465(3)*, CH E 446(3), FD SC 430(3), I E 312(3)
(e) Structural Systems: B E 462(3)*, A E 308(4), C E 340(3), C E 341(3), C E 342(3)

Last Revised by the Department: Summer Session 2009

Blue Sheet Item #: 37-05-031

Review Date: 2/24/09

UCA Revision #2: 7/26/07

EN

Agricultural Communications Minor

University Park, College of Agricultural Sciences (AGCOM)

Through the Department of Agricultural and Extension Education, this interdisciplinary program of study is designed to introduce majors in the College of Agricultural Sciences to the skills and professional practices in communications and to the interdependence between communications and society. A grade of C or better is required in every course used to satisfy the requirements for the minor.

Students are required to complete a total of 19 credits, including 6 credits at the 400 level.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 19 credits

PRESCRIBED COURSES (7 credits)
COMM 160(1) (Sem: 1-2)
COMM 260W(3) (Sem: 3-4)
AGCOM 462W(3) (Sem: 5-8)

ADDITIONAL COURSES (12 credits)
Select 3-6 credits from AEE 330W(3), AEE 440(3), or AGCOM 495(1-3) (Sem: 3-8)
Select 3-6 credits from COMM 180 GS(3), COMM 283W(3), COMM 401(3), COMM 403(3), COMM 405(3), COMM 409(3), COMM 411(3), COMM 413W(3), or COMM 460W(3) (Sem: 3-8)
Select 3 credits from COMM 401(3), COMM 403(3), COMM 405(3), COMM 409(3), or COMM 413W(3) (Sem: 5-8)

Last Revised by the Department: Summer Session 2007

Blue Sheet Item #: 35-02-001

Review Date: 03/12/08

AG

Agricultural Economics and Rural Sociology Minor

University Park, College of Agricultural Sciences (AE RS)

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

SUPPORTING COURSES AND RELATED AREAS: (18 credits)
Select 12 credits of Agricultural Economics and Rural Sociology courses (Sem: 1-6)
Select 6 credits of 400-level Agricultural Economics and Rural Sociology courses (Sem: 7-8)

Last Revised by the Department: Fall Semester 2001

AG

Agricultural Systems Management Minor

University Park, College of Agricultural Sciences (A S M)

The Agricultural System Management minor covers the mechanical, structural, natural resource, processing, and electronic technologies applied in agriculture systems. Students who graduate with this minor will have a solid understanding of how physical sciences and biological principles apply to real world problems in food and fiber industries. With industry teams often formed purposefully with many disciplines represented, this background of applied engineering basics and the focus on quantitative analysis has proven helpful to past graduates.

Integration of the applied technologies is addressed using a systems approach in each required course. Technologies addressed by courses in this minor include combustion engines, electric motors, mechanical and hydraulic power transmission systems, mobile equipment functions and operations, sensor and control systems, building structures, ventilation, drying, irrigation, drainage, food processing. The minor is targeted to students who will use these technologies or manage others who are responsible for systems utilizing these technologies. Most courses required for the minor are taught by engineering faculty, and nearly every course has a laboratory period.

Admission to the minor requires introductory calculus (MATH 110 or MATH 140) and introductory physics (PHYS 211 or PHYS 250).

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

ADDITIONAL COURSES (18 credits)
Students must select from the following to account for 18 or more credits: A S M 221(3), A S M 307(3), A S M 310(3), A S M 320(3), A S M 326(2), A S M 327(3), A S M 420(3), A S M 422(3), A S M 424(3), A S M 425(3), A S M 426(3), A S M 428(3), A S M 429W(3). A total of 3 credits in A S M 495(1-3), A S M 496(1-3) and/or A S M 497(1-3) may also be used.

Last Revised by the Department: Fall Semester 2005

Blue Sheet Item #: 33-04-002

Review Date: 1/18/05

AG

Agronomy Minor

University Park, College of Agricultural Sciences (AGRO)

Agronomy is concerned with the principles and practices of field crop production and the conservation of soils and land resources. Areas of emphasis include crop production and protection, plant breeding, forage management, nutrient management, and soil conservation and fertility. Education in this minor emphasizes the principles of plant and soil management and the basic sciences upon which these principles are grounded. A minor in agronomy can complement several majors, and will enhance career opportunities in farm management and the agricultural industry. Employment possibilities include farm chemical and fertilizer store managers, sales representatives, field and laboratory technicians, crop management consultants, extension agents, soil and water conservationists, and inspectors for various state and federal regulatory agencies.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES: (6 credits)
AGRO 028(3), SOILS 101 GN(3) (Sem: 3-4)

ADDITIONAL COURSES: (6 credits)
Select 6 credits from AGRO 423(3), AGRO 425(3), AGRO 438(4), or SOILS 402(3) (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS: (6 credits)
Select 6 credits from courses in Entomology, Plant Pathology or AGRO 495(1-5) (Sem: 5-8)

Last Revised by the Department: Fall Semester 2001

Review Date: 1/20/04

AG

Animal Sciences Minor

University Park, College of Agricultural Sciences (ANSCI)

COOPERATING DEPARTMENTS: *Dairy and Animal Science and Poultry Science*

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 20 credits

PRESCRIBED COURSES: (8 credits)
AN SC 201(4), AN SC 290(1), AN SC 301(3) (Sem: 3-4)

ADDITIONAL COURSES: (6 credits)
Select 3 credits from AN SC 207(2) or AN SC 300 GN(3) (Sem: 3-4)
Select 3-4 credits from AN SC 305(3), AN SC 306(3), AN SC 308(4), AN SC 309(4), AN SC 310(3), AN SC 311(4), AN SC 327(3) (Sem:3-6)

SUPPORTING COURSES AND RELATED AREAS: (6 credits)
Select 6 credits of 400-level AN SC courses (Sem: 7-8)

Last Revised by the Department: Fall Semester 2001

Review Date: 6/9/08

AG

Arboriculture Minor

College of Agricultural Sciences (ARBOR)

The Arboriculture minor has been designed to provide students with a comprehensive

introduction to the principled and practices of the arboriculture profession. Combined with a major in Horticulture or Forestry, this minor will help prepare students for a career in arboriculture. The courses in the minor include arboriculture, disease and insect control, the planting and maintenance of plants in the landscape, and management of trees in urban environments. HORT 201, and many of the introductory positions available to graduates with an arboriculture minor, require physical strength and conditioning.The profession of arboriculture has many opportunities available in the application of arboricultural practices, sales, consulting, management of companies, and management of urban trees.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem:1-2)

REQUIREMENTS FOR THE MINOR: 20-21 credits

PRESCRIBED COURSES: (15 Credits)
HORT 201(2), HORT/FOR 301(3) (Sem: 3-4)
ENT 313(2), ENT 314(1) (Sem: 5-6)
FOR 401(3), HORT 408(4) (Sem 7-8)

ADDITIONAL COURSES (5-6 credits)
Select 3 credits from FOR 203(3), HORT 137(3) (Sem: 3-4)
Select 2-3 credits from PPATH 300(3) or PPATH 318(2) (Sem:5-6)

Last Revised by the Department: Fall Semester 2008

Blue Sheet Item #: 36-06-002

Review Date: 4/15/08

AG

Entomology Minor

College of Agriculture Sciences (ENT)

PROFESSOR MICHAEL C. SAUNDERS, *in charge*

Through the Department of Entomology, the minor in Entomology is primarily designed for (but not restricted to) students in the Agroecology major seeking additional studies in the entomological sciences. Successful completion of this minor area of study will help prepare students for graduate studies in entomology and related fields.

A minor in Entomology requires 18 credits in approved courses in addition to the major requirements of the student's choice. Appropriate course substitutions may be considered with minor adviser approval.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem:1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (5 credits)
ENT 313(2), ENT 457(3) (Sem: 2-4)

ADDITIONAL COURSES (13 credits)

Select 1 credit from ENT 314(1) or ENT 316(1) (Sem: 2-4)
Select 3 credits from AGECO 201(3), BIOL 222(3), BIOL 427(3), PPATH 405(3) (Sem: 3-8)
Select 6 credits from ENT 410(3), ENT 412(3), ENT 420(3) (Sem: 4-8)
Select 3 credits of ENT 496(1-18) (Sem: 4-8)

Last Revised by the Department: Fall Semester 2008

Blue Sheet Item #: 36-06-003

Review Date: 4/15/08

AG

Environmental and Renewable Resource Economics Minor

University Park, College of Agricultural Sciences (E RRE)

This minor introduces students to how fundamental economic principles can be used to explain and seek solutions for problems related to the degradation of the environment and unsustainable use of natural resources. This program complements majors that provide a natural science-based approach to environmental issues and provides social-science majors interested in the environment with additional tools for the analysis of social decision-making, and policy objectives. A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (9 credits)
AG EC/CED 201(3), AG EC/E RRE 429(3), ECON 302 GS(3) (Sem: 5-6)

ADDITIONAL COURSES (9 credits)
Select 9 credits from E RRE 431W(3), ECON 428(3), AG EC 450 IL(3), E R M 411 (3), R SOC 327(3), 300- or 400-level internship or independent study (3 credit max.) (Sem:5-8)

Last Revised by the Department: Summer Session 2004

Blue Sheet Item #: 30-04-001

Review Date: 01/15/02

AG

Environmental Resource Management Minor

University Park, College of Agricultural Sciences (E R M)

PROFESSOR ROBERT D. SHANNON, *Program Coordinator*

The Environmental Resource Management (E R M) minor is designed to provide nonmajors with an overview of the principles and practices of managing resources prudently and economically.

The minor was developed to permit students of other majors to have their environmental

interests and training formally documented on their academic records. Because so many of society's activities have an impact on environmental quality, the minor should appeal to students with majors from a wide variety of disciplines, including journalism and education majors who want to write and teach in the environmental field.

The E R M minor includes an introduction to modern resource systems analysis and environmental impact assessment. Students may also elect to take courses in environmental law and resource allocation and economics. Individual programs are determined jointly by the student and the E R M Program Coordinator.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (10 credits)
E R M 151(1) (Sem: 1-2)
E R M 300(3), E R M 412(3), E R M 413W(3) (Sem:5-8)

ADDITIONAL COURSES (8 credits)
Select 8 credits from A S M 327(3), SOILS 101 GN(3), AG EC 201(3), or any E R M course (Sem: 3-8)

Last Revised by the Department: Fall Semester 2001

Review Date: 1/20/04

AG

Environmental Soil Science Minor

University Park, College of Agricultural Sciences (ESOIL)

KATHARINE BUTLER, *Senior Lecturer, Program Coordinator*

The Environmental Soil Science minor enables students to acquire scientific and field-related skills in preparation for environmental careers. Students learn to understand and apply soils and land use information in a wide variety of professional settings. The Environmental Soil Science minor will prepare students for jobs as professional soil scientists or for graduate studies in Soil Science and other interdisciplinary environmental sciences.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (3 credits)
SOILS 101 GN(3) (Sem: 1-5)

ADDITIONAL COURSES (15 credits)
Select 15 credits from SOILS courses in consultation with an Environmental Soil Science adviser, including at least 6 credits at the 400 level. (Sem: 2-8)

Last Revised by the Department: Spring Semester 2004

Blue Sheet Item #: 32-01-001

Review Date: 9/2/03

AG

Equine Science Minor

University Park, College of Agricultural Sciences (EQ SC)

PROFESSOR KAREN VINES, *Program Coordinator*

The Equine Science Minor is designed for students who wish to supplement their academic major with studies in equine science. Students are required to complete a minimum of 20 credits. The core prescribed courses develop a foundation in the basic disciplines of animal science and equine science. Additional courses may be selected by the student to allow further specialization and expertise in exercise physiology and training principles, selection and judging, business/farm management, animal genetics and breeding, nutrition, and physiology. With completion of this minor, students will have a foundation of theoretical and practical knowledge along with learning skills for adapting to changes in equine industry. Courses that make up the minor are appropriate for students with and without prior academic or practical experience with horses. The University Horse Farms and the Agricultural Arena are used extensively for supplementing classroom work with hands-on laboratories. Completion of this minor will enhance a student's ability to work directly in horse production and management and allied industries, or continue academic studies in graduate or professional school.

A grade of C or better must be obtained in each course in order to complete the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 20-23 credits
(At least 8 credits must be at the 400 level.)

PRESCRIBED COURSES (15 credits)
AN SC 037(2), AN SC 201(4), AN SC 217(2) (Sem: 1-4)
AN SC 327(3) (Sem: 5-8)
AN SC 400(1), AN SC 407(3) (Sem: 7-8)

ADDITIONAL COURSES (5-8 credits)
Select 3-4 credits from: AN SC 300 GN(3), AN SC 301(3), AN SC 317(3), AN SC 322(3), B A 250(3), KINES 180(3), KINES 202(4), or VB SC 303(3) (Sem: 5-8)
Select 2-4 credits from: AGRO 423(3), AN SC 417(2), AN SC 420(4), AN SC 423(3), AN SC 426(2), AN SC 431W(4), AN SC 437(3), AN SC 442(3), AN SC 447(3), AN SC 457(3), or AN SC 467(3) (Sem: 5-8)

Last Revised by the Department: Spring Semester 2009

Blue Sheet Item #: 37-02-001

Review Date: 10/7/08

AG

Forest Science Minor

University Park, College of Agricultural Sciences (FORSC)

JAMIE MURPHY, *Instructor, Program Coordinator*

The Forest Science minor is offered for students who wish to achieve a basic competency in forestry without qualifying as professional foresters. This minor is particularly compatible with the Wildlife and Fisheries Science and Wood Products majors.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18-19 credits

PRESCRIBED COURSES: (13 credits)
FOR 203(3), FOR 308(3), FOR 366(4), FOR 421(3), and W P 203(1) (Sem: 3-4)

ADDITIONAL COURSES: (5-6 credits)
Select 2-3 credits from FOR 339(2) or FOR 320(2) (Sem: 3-4)
Select 3 credits from FOR 416(3), FOR 440(3), FOR 455(3), FOR 470(3), FOR 475(3) or FOR 480(3) (Sem: 5-8)
Other FOR courses may be used in lieu of these additional courses by petitioning the Forest Science faculty --at least 3 credits must be taken at the 400-level

Last Revised by the Department: Spring Semester 2002

Blue Sheet Item #: 30-01-001

Review Date: 4/24/03

AG

Horticulture Minor

University Park, College of Agricultural Sciences (HORT)

PROFESSOR CHARLES W. HEUSER, *Program Coordinator*

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18-19 credits

PRESCRIBED COURSES (9 credits)
HORT 101(3), HORT 202(3), and HORT 315(3) (Sem: 1-6)

ADDITIONAL COURSES (9-10 credits)
Select 3 credits in systematics from HORT 131(3), HORT 137(3), HORT 138(3), or HORT 232(3) (Sem: 3-4)
Select 6-7 credits in foundation and production courses from HORT 402W(3), HORT 407(3), HORT 412W(3), HORT 420(3), HORT 430W(3), HORT 431(3), HORT 432(3), HORT 433(3), HORT 444(4), HORT 450(3), HORT 453(3), HORT 455(3), or HORT 469(3) (Sem: 7-8)

Last Revised by the Department: Fall Semester 2001

AG

International Agriculture Minor

University Park, College of Agricultural Sciences (INTAG)

This minor is an interdisciplinary program of study designed to enable students to (1) gain an awareness and appreciation for the interrelationship and interdependency of the nations of the world for their food and fiber; (2) gain an awareness of the resources available to solve problems in international agriculture; and (3) recognize systems of learning transfer and understand the impact of technological transfer across cultures.

This minor may be combined with any undergraduate major in the University. It requires 18 credits in addition to the baccalaureate degree and departmental major requirements of the student's choice. Some courses require prerequisites not included in the minor. Foreign language competence is highly recommended. A grade of C or better is required for all courses in the minor.

Students may apply for admission to the minor by completing and submitting an application for admission to a minor to 323 Agriculture Administration Building, University Park Campus. Approval from the student's major program adviser also is required. For more information, contact Dr. Thomas H. Bruening, 323 Agriculture Administration Building, (814) 863-7420.

A grade of C or better is required for all courses in the minor. Students must have six credits of 400 level course work for the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18-21 credits

Option 1: Students are given the option of participating in a semester study abroad program that would be discussed and approved by the INTAG coordinator and the student's academic advisor. Minimum requirement is 18 credits. The semester study abroad program needs to focus on courses within the food, agriculture or natural resources areas.

Option 2: Students may elect to take 18 course credits from the following list:

PRESCRIBED COURSES (6 credits)
INTAG 100 GS;IL(3), INTAG 481(3) or AEE 400(3) (with the travel component) (Sem: 3-4,7-8)

ADDITIONAL COURSES (9-12 credits)
Select courses from three of the four categories:
Category 1: Economics & Social Systems
AG EC 450 IL(3), GEOG 123 GS;IL(3), NUTR/S T S 430 IL(3), R SOC 327(3), R SOC/WMNST/CED 420 US;IL(3) (Sem: 1-8)
Category 2: Education, Communication, & Language
AEE 400(3), AEE 440(3), AEE 450(3), YFE 455(3), Any University language skill development course (Sem: 1-8)
Category 3: Animal & Plant Systems
AGECO 134 GN(3), AGRO 028(3), AN SC 201(4), SOILS 101 GN(3) (Sem: 1-8)
Category 4: Natural Resources and Environment
B E 300(3), FOR 418 US;IL(3), FOR 488W(3) (Sem: 1-8)

SUPPORTING COURSES AND RELATED AREAS (3 credits)
INTAG 296(1-18), INTAG 297(1-9), INTAG 298(1-9), INTAG 397(1-9), INTAG 398(1-9), INTAG 399, INTAG 495(1-13), INTAG 496(1-18), INTAG 497(1-9), INTAG 498(1-9), INTAG 499 IL(1-12) (Sem: 1-8)

Last Revised by the Department: Summer Session 2006

Blue Sheet Item #: 34-01-006

Review Date: 8/30/05

UCA Revision #2: 7/27/07

AG

Leadership Development Minor

University Park, College of Agricultural Sciences (L DEV)

Mark A. Brennan, Associate Professor, *In Charge*

This minor is designed for students in any major of the University wanting to supplement their program with studies in leadership development. The minor consists of 18 credits, at least 3 of which are an internship experience. This minor provides students with a fundamental concept of leadership development and expands in three related dimensions. A grade of C or better is required in all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (12 credits)
AEE 311(3), AEE 360(3) (Sem: 5-6)
AEE 460(3), AEE 495(3) (Sem: 7-8)

SUPPORTING COURSES AND RELATED AREAS (6 credits)
Select 6 credits in consultation with an adviser from courses on the Department approved list that focus in one of three support areas: leadership styles, ethical and moral dimensions of leadership, or global leadership (Sem: 1-8)

Last Revised by the Department: Fall Semester 2000

Blue Sheet Item #: 28-03-005

Review Date: 1/11/00

AG

Mushroom Science and Technology Minor

University Park, College of Agricultural Sciences (M S T)

PROFESSOR DANIEL J. ROYSE, in charge

This interdisciplinary minor is designed to prepare students for a career in the mushroom industry. The minor offers practical work experience at the University's Mushroom Research Center and Mushroom Test Demonstration Facility.

Students are required to complete a minimum of 18 credits. The core of prescribed courses provides a foundation in the basic fundamentals of mushroom science and technology. Independent study courses may be selected by the student to emphasize

various aspects of *Agarics* or specialty mushroom production. A period of internship or a field experience is required.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18-19 credits

PRESCRIBED COURSES (13 credits)
AG 495(4), PPATH 405(3), PPATH 425(4), PPATH 496(2) **[7](#mnote07)** (Sem: 5-8)

ADDITIONAL COURSES (2-3 credits)
Select 2-3 credits from AG 200A(2), AG 200B(2), MGMT 100(3) (Sem: 3-8)

SUPPORTING COURSES AND RELATED AREAS (3 credits)
Select 3 credits at the 400 level from department list (Sem: 5-8)

[7] Students must select, in consultation with the Mushroom Science and Technology adviser, at least 2 credits of independent study courses with the University's Mushroom Research Center or Mushroom Test Demonstration Facility.

Last Revised by the Department: Summer Session 2006

Blue Sheet Item #: 34-02-001

Review Date: 10/11/05

AG

Off-Road Equipment Minor

University Park, College of Agricultural Sciences (OFFRD)

This interdisciplinary minor complements several engineering, agricultural, and mining degrees, helping students understand some specific technological aspects of mobile equipment (from lawn tractors to large excavators). The minor would strengthen the program for students with machinery interests by exposing them to several of the technical aspects of off-road equipment such as electronics, power generation, power transmission, traction, ergonomics, and safety.

The minor in Off-Road Equipment requires 18-21 credits from the approved courses. Courses in the minor have prerequisites including calculus, physics, and, depending on the student's major, at least one engineering or engineering technology type course (e.g., A S M 221). These courses should be completed prior to entering the minor.

A grade of C or better is required for all courses taken to satisfy the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18-21 credits

PRESCRIBED COURSES (3 credits)
A S M 420(3) (Sem: 6-8)

ADDITIONAL COURSES (15-18 credits)
Select 3 credits from A S M 320(3) or M E 431(3) (Sem: 5-8)
Select 3-4 credits from B E 303(2) and B E 306(2), or A S M 310(3) or M E 360(3) (Sem: 5-8)

Select 3-4 credits from B E 305(3), A S M 428(3), or M E 345(4) (Sem: 5-8)
Select 3-4 credits from A S M 424(3), AGRO 425(3), HORT 408(4), or TURF 425(3) (Sem: 5-8)
Select 3 credits from B E 461(3) or A S M 426(3) (Sem: 5-8)

Last Revised by the Department: Spring Semester 2010

Blue Sheet Item #: 38-01-002

Review Date: 8/25/09

UCA Revision #2: 7/30/07

AG

Plant Pathology Minor

University Park, College of Agricultural Sciences (PPATH)

PROFESSOR FREDERICK E. GILDOW, *in charge*

This interdisciplinary minor in Plant Pathology is designed to aid student preparation for employment in agricultural and horticultural sciences requiring knowledge of plant health and to prepare students for graduate studies in fields of plant biology. This minor may be designed to supplement majors in any field of the biological sciences.

Plant Pathology is a science concerned with understanding the causes of plant diseases and the utilization of this knowledge for the development of ecologically sound and sustainable control strategies. Students completing this minor will gain knowledge of microbe-plant interactions, molecular mechanisms of pathogenesis and genetic resistance, abiotic stresses, and environmental factors influencing control of plant disease.

The minor in Plant Pathology requires 19 credits in approved courses in addition to the major requirements of the student's choice.

Students must receive a grade of C or better in all courses required for the minor. For admission to the minor, contact the Department of Plant Pathology.

Scheduling Recommendation by Semester Standing given like (Sem:1-2)

REQUIREMENTS FOR THE MINOR: 19 credits

PRESCRIBED COURSES (3 credits)
PPATH 405(3) (Sem: 5-6)

ADDITIONAL COURSES (13 credits)
Select a minimum of 10 credits from the following:
BIOL 230W GN(4) (Sem: 3-4)
PPATH 318(4) (Sem: 3-8)
E R M 430(3), PPATH 416(2 or 4), PPATH 417(3), PPATH 419(2) (Sem: 5-8)
Select a minimum of 3 credits from PPATH 400(2) or PPATH 496(1-3) (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS (3 credits)
Select 3 credits from department list, with approval of Minor Adviser (Sem: 5-8)

Last Revised by the Department: Summer Session 1998

Blue Sheet Item #: 26-04-002

Review Date: 3/31/00

Last reviewed by Publications: 8/2/05

AG

Poultry and Avian Science Minor

University Park: College of Agricultural Sciences (P A S)

PROFESSOR ROBERT G. ELKIN, *Program Coordinator*

The Poultry and Avian Science Minor is designed for students who wish to supplement their academic major with studies focused on the biology, and management, of avian species, with an emphasis on domestic fowl. In recognition of the diverse career opportunities in the modern poultry and game bird industries, the minor is designed to also accommodate students with primary interests in agribusiness management, food science, and wildlife science. Students are required to complete a minimum of 19 credits (9 credits at the 400 level). The three prescribed courses provide a foundation of knowledge pertaining to both avian sciences and the commercial poultry industry, while additional courses selected by the student will allow for further specialization in the foundation animal science disciplines, agribusiness management, food science, and wildlife and fisheries science. In addition, credits from poultry or avian internship experiences and/or independent study projects may also be applied towards meeting the requirements of the minor.

The University's Poultry Education and Research Center is used extensively for supplementing classroom work with hands-on laboratories. The flexibility of the minor permits program planning commensurate with an individual's interests and professional goals, and should enhance the student's ability to compete for related positions in industry, government, or academia (graduate or professional school).

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 19 credits

PRESCRIBED COURSES (10 credits)
AN SC 211(3) (Sem: 1-4)
AN SC 311(4) (Sem: 5-7)
AN SC 425(3) (Sem: 6-8)

ADDITIONAL COURSES (9 credits)
Select 3 credits from: AG BM 302(3), AG BM 338(3), AN SC 207(2), AN SC 208(1) (Sem: 3-6)
AN SC 300 GN(3), AN SC 301(3), AN SC 322(3), AN SC 395(1-3) **[*](#mnote*)** , W F S 300(2), W F S 301(2) (Sem: 5-8)
Select 6 credits from: AG BM 407(3), AG BM 408(3), AG BM 420(3), AG BM 460(3), AN SC 400(1), AN SC 418(3), AN SC 420(4), AN SC 421(2), AN SC 423(3), AN SC 496(3)**[*](#mnote*)** , FD SC 408(2), FD SC 409W(3), FD SC 411(2), FD SC 415(3), VB SC 420(3), W F S 406(1), W F S 407(3), W F S 447W(3) (Sem: 7-8)

[*] AN SC 395 and AN SC 496 must have a poultry or avian biology emphasis.

Last Revised by the Department: Summer Session 2009

Blue Sheet Item #: 37-05-003

Review Date: 2/24/09

AG

Wildlife and Fisheries Science Minor

University Park, College of Agricultural Sciences (W F S)

JAMIE MURPHY, *Instructor, Program Coordinator*

The Wildlife and Fisheries Science minor provides non-majors with an introduction to the principles and practices of wildlife and fisheries conservation, research, and management. Although the minor includes both wildlife and fisheries course offerings, courses may be selected to provide a focus in one area or the other.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (6 credits)
W F S 209(3), W F S 430(3) (Sem: 5-6)

ADDITIONAL COURSES (12 credits)
Select 12 credits from W F S 300(2), W F S 407(3), W F S 408(3), W F S 410(3), W F S 422(3), W F S/E R M 435(3), W F S 440(3), W F S 447W(3), W F S 450(3), W F S 452(2), W F S 460(3), W F S 462(3), W F S 463W(3) (Sem: 5-8)

Last Revised by the Department: Summer Session 2009

Blue Sheet Item #: 37-06-003

Review Date: 4/14/09

AG

Wood Products Marketing Minor

University Park, College of Agricultural Sciences (WPMKT)

JAMIE MURPHY, *Instructor, Program Coordinator*

The Wood Products Marketing minor offers students in other majors, especially those oriented toward business, science, or engineering, an opportunity to develop a basic competency in wood products marketing and processing. Students will obtain knowledge and skills particularly helpful for those who wish to seek employment in sales, as a specifier of wood-based materials for construction and design, or in other related fields in the wood products industries.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (15 credits)

W P 411(4), W P 417(4), W P 435(3), W P 437W(4) (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS (3 credits)
Select 3 credits of W P courses (Sem: 3-8)

Last Revised by the Department: Fall Semester 2001

Review Date: 4/24/03

AG

Youth and Family Education Minor

University Park, College of Agricultural Sciences (YFE)

Professor Daniel F. Perkins, *in charge*

The Youth and Family Education minor is an interdisciplinary program of study designed to prepare students for work in the Penn State Cooperative Extension or other nonformal education programs.

The minor offers course work from several disciplines and addresses student needs in areas such as nonformal education methods, adult education, leadership, youth programs, and communication methods and media. A period of internship or field experience is required. To complete a bachelor's degree with a minor in Youth and Family Education, a student is required to complete 18 credits from a list of recommended courses. The core program consists of 15 credits. Students are expected to strengthen their expertise by taking at least 3 additional credits from the courses recommended.

A grade of C or better is required for all courses in the minor.

Scheduling Recommendation by Semester Standing given like (Sem: 1-2)

REQUIREMENTS FOR THE MINOR: 18 credits

PRESCRIBED COURSES (15 credits)
AEE 450(3), YFE 455(3), YFE 495(6), R SOC 305W(3) (Sem: 5-8)

SUPPORTING COURSES AND RELATED AREAS (3 credits)
ADTED 460(3), AEE 440(3), YFE 295(1-2), YFE 496(1-3), or YFE 497(1-9) (Course selection may be influenced by experience and educational background of the student. Individual programs are set jointly by the student and the program committee chair.) (Sem: 1-8)

Last Revised by the Department: Summer Session 1999

Blue Sheet Item #: 27-05-001A

Review Date: 1/30/00

AG

| The Pennsylvania State University(http://www.psu.edu/) |
©2001-2008. All rights reserved.

This is the official bulletin of The Pennsylvania State University. Programmatic expectations for General Education are those in effect at the time of admission to degree candidacy, and college and major requirements are those in effect at the time of entry to college and major. These are accurately indicated in each student's degree audit.

The University reserves the right to change the requirements and regulations listed here and to determine whether a student has satisfactorily met its requirements for admission or graduation, and to reject any applicant for any reason the University determines to be material to the applicant's qualifications to pursue higher education. Nothing in this material should be considered a guarantee that completion of a program and graduation from the University will result in employment.

The University Faculty Senate has responsibility for and authority over all academic information contained in the Undergraduate Bulletin.