



COLLEGE OF AGRICULTURE AND NATURAL RESOURCES

GRADUATE PROGRAMS

- **Agricultural and Resource Economics (MS)**
- **Agricultural Education (MA)**
- **Animal and Food Sciences (MS, PhD)**
- **Bioresources Engineering (MS)**
- **Entomology and Wildlife Ecology (MS, PhD)**
- **Operations Research (MS, PhD)**
- **Plant and Soil Sciences (MS, PhD)**
- **Public Horticulture (Longwood Graduate Program) (MS)**
- **Statistics (MS)**

The College of Agriculture and Natural Resources offers graduate education through all of its academic departments: Animal and Food Sciences, Bioresources Engineering, Entomology and Wildlife Ecology, Food and Resource Economics, and Plant and Soil Sciences. Each department offers programs leading to the Master of Science degree; additionally, programs leading to the Doctor of Philosophy degree are offered in Animal Science, in Entomology and Wildlife Ecology, Operations Research, and in Plant and Soil Sciences. The College manages an MS degree program cooperatively with Longwood Gardens in the area of Public Horticulture. Additionally, the MA degree is offered in Agricultural Education through the Department of Food & Resource Economics.

The College is interested in attracting highly qualified students with a desire to enter into research and teaching. Professors are formally responsible for research projects in the Delaware Agricultural Experiment Station, and students often move into a facet of an established research project. Close association with the departmental research program affords opportunities to broaden a student's perspective of the research process. Each department has several areas of focus within the discipline.

The Department of Animal and Food Sciences has three graduate degree offerings: the PhD in Animal Science, the MS in Animal Science and the MS in Food Science. In Animal Science, a student may specialize in animal physiology and nutrition; avian microbiology, immunology and pathology; avian molecular biology, genomics, and bioinformatics; and ruminant nutrition, microbiology, and physiology. The MS program in Food Science emphasizes food safety with a focus on food processing and packaging.

The Department of Bioresources Engineering offers a MS degree in Bioresources Engineering and research opportunities through the Operations Research program (see Food & Resource Economics) with studies involving soil and water resources, or environmental issues.

The Department of Entomology and Wildlife Ecology offers graduate opportunities in both applied and basic research dealing with insects, birds, mammals, and other wildlife. Areas of emphasis include ecology, plant-insect interactions, biological control, and conservation biology.

The Department of Food and Resource Economics offers areas of study in quantitative economics, international agricultural trade, economic development, resource economics, marketing and policy.

Also housed in the department is the Statistics program, which offers an MS in Statistics, and the interdisciplinary Operations Research program, which offers the MS and the PhD.

In Plant and Soil Sciences, areas of study include plant breeding, tissue culture, molecular biology, pathology, plant improvement, physiology and horticulture. In Soil Science the areas are soil chemistry, biochemistry, microbiology and management. A specialized MS program, the University of Delaware/Longwood program in Public Horticulture is a 2-year Master's degree program requiring a thesis.

The College of Agriculture and Natural Resources houses modern research laboratories and equipment in Worrlow Hall, Townsend Hall, the Charles C. Allen, Jr. Laboratory, the Fischer Greenhouse Laboratory, the Delaware Biotechnology Institute, and other buildings located on the Delaware Experiment Station. Field plots, a 35-acre woodlot, and animal research facilities are available for graduate research. An excellent library and computing site are located in the college. For more information, please see <http://ag.udel.edu>.

AGRICULTURAL EDUCATION

Telephone: (302) 831-1357
<http://ag.udel.edu/>

PROGRAM OVERVIEW

The Agricultural Education Program offers a Master of Arts (MA) degree that qualifies the individual for initial teacher certification in the areas of agricultural and natural resources education. Recent undergraduate students or career changers in the areas of agriculture and natural resources or in various technology fields are likely candidates for this degree program.

The pragmatic, hands-on program provides pedagogical skills and uses an investigative, scientific, design-and-construct, and problem solving approach to teaching. The curriculum is designed to allow students to teach in both the classroom and laboratory setting.

REQUIREMENTS FOR ADMISSION

In addition to the general graduate admission requirements of the University, all applicants are required to have satisfactorily

completed an approved undergraduate baccalaureate program of study and may not be certified or employed as a teacher. For students lacking appropriate preparatory course work, additional courses applicable to certain areas of study may be required prior to admission, or students may be admitted with the provision that certain content courses be completed concurrent with the courses in the degree program. On a 4.0 system, applicants must have a general undergraduate academic index of 2.5 and a minimum 2.75 index in their major field of study. Applicants must have a combined score of at least 1050 on the verbal and quantitative portions of the GRE. Students for whom English is not their first language must attain a minimum score of 600/250/100 on the paper based/computer based/IBET TOEFL examination. All students must provide three letters of recommendation from individuals able to assess the applicant's academic potential. The deadline for application is April 2 of each year. Admission to graduate programs at the University of Delaware is selective and competitive based on the number of well-qualified applicants and the limits of available faculty and facilities. Those who meet stated minimum academic requirements are not guaranteed admission, nor are those who fail to meet those requirements necessarily precluded from admission if they offer other appropriate strengths.

REQUIREMENTS FOR THE MA DEGREE

Students are required to complete a minimum of 33 credit hours, including 21 credit hours of professional education courses, 9 credit hours of an Internship in Teaching, and a three credit Student Teaching Seminar, which is the final requirement for the degree. The Internship in Teaching is a placement in a middle and/or secondary school and, with the degree, prepares a student for initial certification in Agricultural and Natural Resources Education. To be awarded the degree, students must achieve a cumulative GPA of 3.0 on a 4.0 scale for all graduate course work taken and a minimum grade of B in AGED 600 (Internship in Teaching).

ANIMAL AND FOOD SCIENCES

Telephone: (302) 831-2524
<http://ag.udel.edu/>
 Faculty Listing: <http://ag.udel.edu/anfs/faculty/facultyStaff.htm>

PROGRAM OVERVIEW

The Department of Animal and Food Sciences offers three graduate degree programs: The Master of Science (MS) degree in Animal Science, the MS degree in Food Science and the Doctor of Philosophy (PhD) degree in Animal Science.

In Animal Science, research programs are offered in physiology; ruminant and poultry nutrition; microbiology, immunology and pathology; molecular biology, genomics, and bioinformatics.

In Food Science, research programs are offered in food bacteriology; virology and parasitology; food biochemistry; and food processing.

RESEARCH FACILITIES

Well-equipped laboratories for conducting research are located in Worrilow and Townsend Halls, the Allen Biotechnology Laboratory, the Delaware Biotechnology Institute (DBI), and the Delaware Agricultural Experiment Station Farm. The Allen Biotechnology Laboratory is a state of the art, biosafety level 2 and 3 facility for the study of conventional and highly pathogenic avian disease agents and recombinant poultry microorganisms. The department maintains dairy cattle, sheep, and poultry for graduate instruction and research on the Delaware Agricultural Experiment Station Farm. Students have access to supercomputers, servers and

desk top computers for data collection, analysis and presentation and an excellent library in the College of Agriculture and Natural Resources.

REQUIREMENTS FOR ADMISSION

An applicant for graduate study in Animal and Food Sciences should have an appropriate background from the Baccalaureate degree, with a minimum cumulative grade point average of 2.75, and a 3.00 average in his/her major. Undergraduate preparation for most areas of study should include general and organic chemistry, biology/microbiology, biochemistry, physics, and calculus. For students lacking appropriate preparatory course work, additional courses applicable to certain areas of study may be required prior to admission. A Graduate Record Examination combined score (quantitative + verbal sections) of 1075 on the general exam is desirable. Exceptions may be made for students with special backgrounds, abilities, and interests. All students must provide three letters of recommendation from former professors, a completed Graduate Studies Application form, and a completed assistantship form if applying for financial aid. Foreign students must demonstrate competence in the use of the English language by a minimum score of 575/233/85 on the paper based/computer based/IBET TOEFL and provide evidence of sufficient financial support for the course of the degree program. Foreign students applying for a teaching assistantship must have a minimum score of 600/250/100 on the paper based/computer based/IBET TOEFL examination. Applicants may be requested to visit the department for a personal interview before a final decision concerning admission is made. Admission to the graduate program is dependent upon availability of an appropriate faculty advisor in the student's area of study.

FINANCIAL AID

Please refer to the chapter "Graduate Fellowships and Assistantships" in this catalog.

REQUIREMENTS FOR THE DEGREES IN ANIMAL AND FOOD SCIENCES

The MS degree program in Animal Science and the MS degree program in Food Science require a minimum of 30 graduate credit hours of which six credits must be a master's thesis. The programs are usually expected to be completed in two years of full-time study. Students, with the assistance of their advisor, are required to prepare and present a research proposal to their graduate committee for review and approval of the proposed research project. Course selections are made with the approval of the student's graduate committee. Candidates for the MS degree are required to pass an oral examination on the thesis and allied areas of study. All students pursuing the MS degree will complete the following core courses; ANSC 865 Seminar and CHEM 527 Introductory Biochemistry or CHEM 641 Biochemistry, and a statistics course [FREC 608 Research Methods, FREC 806 Research Techniques and Procedures, or equivalent]. Attendance in Graduate Seminar (ANSC 865) is required each semester for all graduate students. Following completion of the research outlined in the proposal, the MS degree candidate will prepare a written thesis according to the guidelines set forth by the Office of Graduate Studies. A thesis defense, preceded by a seminar, will be held. The student's advisor and graduate committee will administer and evaluate the thesis defense.

The PhD degree program provides the necessary flexibility to design an appropriate plan of study and has only minimal course requirements. A doctoral committee will be appointed within six months following matriculation. The committee shall consist of between four and six faculty or professional members nominated by the graduate advisor and approved by the Department Chairperson. Participation from industry, government or other academic departments on the doctoral committee may be required depending