

# BIOLOGICAL SCIENCES: AGRICULTURAL SCIENCES (PH.D.)

<https://colsa.unh.edu/dbs/biological-sciences-graduate-program>

## Description

The Agricultural Sciences (AS) option is intended for students interested in careers in agriculture and aquaculture-related fields, particularly in linking the diverse components of agricultural production systems. The option centers on basic and applied research on agriculturally relevant plants, microbes and animals, both terrestrial and aquatic, spanning genetics, physiology, biotic and abiotic stresses, environmental interactions, production systems, and cultural practices. Students in agricultural sciences will acquire a broad knowledge of agricultural production, with strong emphasis on improving productivity and overall sustainability while minimizing environmental impacts. Within this overarching theme, students will conduct focused research in one or more of the following areas: controlled environment agriculture; integrated agricultural production systems; agricultural nutrient capture and reuse; aquaculture of freshwater and marine plants and animals; agroecology; dairy nutrition and reproductive management; equine management; crop production; integrated pest management; agricultural biotechnology; plant breeding, genetics, and genomics; and plant pathology. The agricultural sciences option prepares students to become experts in professional fields related to agriculture, and leaders in collaborative and interdisciplinary efforts to address local, regional, national and/or global agricultural issues. Students may pursue careers in teaching and/or research in federal, state, and private organizations.

New MS and PhD programs in Agriculture, Nutrition, and Food Systems (ANFS) will commence in Fall 2018. Primary areas of focus will include human nutrition; dairy nutrition and reproductive management; controlled environment agriculture; integrated agricultural production systems; agricultural nutrient capture and reuse; aquaculture of freshwater and marine plants and animals; agroecology; equine management; crop production; integrated pest management; agricultural biotechnology; plant breeding, genetics, and genomics; and plant pathology. Students entering the Agricultural Sciences (AS) option within Biological Sciences will transfer to the new Agriculture, Nutrition, and Food Systems (ANFS) program within their first year. For further information contact Peter Erickson.

## Requirements

Students work with their advisor and their Doctoral Guidance Committee to plan a program of study including the required core courses and competencies, and develop a viable research proposal. The Guidance Committee is normally established by the end of the first semester, and should meet by the end of the second semester. The student presents to the Guidance Committee a preliminary research proposal in which the soundness, originality, and feasibility of the planned research are clearly described. The Guidance Committee is responsible for approving the proposal, and also oversees the qualifying examination through which the student is admitted to doctoral candidacy. The Doctoral Dissertation Committee is established at this point. To earn the Ph.D. degree, students must complete an original dissertation project, present the results at a

public seminar, pass an oral dissertation defense consisting of questions from members of the Dissertation Committee, and have the dissertation approved by the Dissertation Committee and accepted by the Graduate School.

## Number of Credits Required

There is no specific credit requirement for the Ph.D., though students must take all required core courses. The Biological Sciences Program specifies 2-4 credits' worth of required courses (BIOL 901 Introductory Graduate Seminar for all, BIOL 903 Graduate Research Techniques depending on option; 2 credits each); most students use 6 more credits to satisfy the competency requirement in experimental design/analysis (BIOL 811 Applied Biostatistics II or BIOL 933 Design, Analysis, and Interpretation of Experiments, 4 credits) and recommended coursework in writing/communication (BIOL 902 Writing and Publishing Science or BIOL 950 Scientific Communication, 2 credits). Other graduate coursework approved by the student's committee can substitute for any of these courses except BIOL 901 Introductory Graduate Seminar.

Up to 8 credits of graduate credit from another institution may be transferred, provided the credits were not counted toward another degree, and the course grade was a B or higher. Petitions requesting transfer credit must be supported by the advisor and graduate committee, and approved by the UNH Graduate School.

## Required Courses, Competencies, and Electives

All students in the Biological Sciences Graduate Program are required to take Introductory Graduate Seminar BIOL 901 and fulfill all applicable competency requirements (these may vary by option). Those with teaching assistantships (TAs) must enroll in College Teaching LSA 900 before or concurrent with their first teaching assignment.

1. Core Courses.
  - a. Introductory Graduate Seminar (BIOL 901). This first-semester course focuses on key information and skills for a successful transition into the graduate program, familiarizing students with program requirements and faculty and providing an opportunity to meet others in their cohort.
  - b. Graduate Research Techniques (BIOL 903). Normally taken in the second semester, this course introduces students to diverse research approaches, tools, and facilities within their option. Content will vary to align with the needs and specializations of each cohort of graduate students.
2. Competency in experimental design and analysis. This may be fulfilled by previous graduate coursework (as determined by the student's advisor and committee), or by taking one graduate-level course. Two advanced courses in experimental design and analysis are offered, normally in alternate years. The first is Applied Biostatistics II (BIOL 811), and the second is Design, Analysis and Interpretation of Experiments (BIOL 933). Either course, or an equivalent approved by the student's advisor and committee (e.g. NR 909 Analysis of Ecological Communities and Complex Data), can be used to fulfill this competency requirement.
3. Electives. Students will work with their advisor and committee to identify additional courses appropriate for their area of specialization and their career objectives. Recommendations often include coursework in professional writing and communication: Writing and Publishing Science (BIOL 902) is taught fall semester, and open to

students at any stage of the program. Scientific Communication (BIOL 950) is usually taught in spring. A course in Grant Writing (NR 905) is offered by the Department of Natural Resources.

## **Additional Information/Requirements**

All students in the Biological Sciences Program are expected to present their research in public seminars (including the UNH Graduate Research Conference), and acquire teaching and/or mentoring experience.

A summary degree requirements is available at <http://colsa.unh.edu/dbs/biological-sciences-graduate-program/biological-sciences-agricultural-sciences-phd>, along with the program's graduate handbook, which includes expectations, guidelines, and detailed policies.