

AGRICULTURAL SCIENCES (PH.D.)

<https://colsa.unh.edu/agriculture-nutrition-food-systems/program/phd/agricultural-sciences>

Description

The Doctor of Philosophy (Ph.D.) in Agricultural Sciences graduate program offers a flexible course of study that provides education and research experience plant and animal agriculture, food systems, and related fields. Graduate students are engaged in an interdisciplinary department focusing on the farm to fork wellness continuum and an integrated approach to solving problems. Students will also develop independent and team research experience.

Our faculty offer education and research opportunities in the diverse components of food systems, and plant and animal agricultural systems including breeding and genetics, physiology, environmental interactions, protected agriculture, organismal health, agroecology, and pathology. Beyond the classroom and the lab, students will hone communication skills that are essential for professional scientists through teaching, extension, and outreach opportunities with stakeholders and constituents.

With a Ph.D. in Agricultural Sciences, students are prepared to pursue careers in college teaching and research positions in industry and government. Students may work in plant and animal agriculture, food production and distribution systems, teaching, public service, research in federal, state, nonprofit, private organizations, or related fields.

The Ph.D. program is thesis-based, with the expectation of generating and publishing substantial new knowledge in the field of interest.

Requirements

Doctor of Philosophy (Ph.D.) graduate students work with their advisor and Doctoral Guidance Committee to plan a program of study including the required core courses, competencies, and develop a research proposal. To complete the degree, students must complete a research proposal, pass a qualifying exam, conduct dissertation research, and complete and defend a dissertation.

Guidance and Dissertation Committees: During the first semester, the student and advisor jointly select members of a guidance committee. A nomination form must be sent to the graduate school to officially appoint the committee membership. The Guidance Committee consists of 5 members and is responsible for approving the proposal and oversees the qualifying examination. Once the student has advanced to candidacy, the Doctoral Dissertation Committee is formed. The Dissertation Committee is responsible for administering the dissertation exam.

Dissertation Proposal and Defense: All Ph.D. students are required to develop a formally approved research proposal typically by the end of the third semester and no later than the fourth semester. Proposals are approved by the dissertation committee and the major advisor. In addition to the written proposal, students are expected to present a proposal defense presentation. This proposal should consist of the following:

1. comprehensive review of the literature related to the student's research topic.
2. statement of need/justification.
3. research goal with a list of research objectives with stated hypotheses that address the major research questions.
4. plan of work describing the experimental approaches or methods to be used in answering the thesis questions.
5. Expected outcomes and potential pitfalls for each objective.
6. Timeline for completion of the work.
7. preliminary research where appropriate.

Candidacy: Following approval of the research proposal and completion of coursework, doctoral students should advance to candidacy. Candidacy is reached after passing a formal qualifying examination that assesses both broad basic knowledge of the student's field, and topics central to the research project. The purpose of the exam is to measure of the student's likelihood of successfully completing a doctoral program. The qualifying exam comprises written and oral components.

1. Written exam: Student choose three areas of specialization in consultation with their Doctoral Guidance Committee. The advisor solicits questions from Committee members and administers the exam. Once completed, Committee members evaluate the responses. The student is expected to demonstrate competence in each of the chosen areas, reflected in clear, concise, well-organized synthetic essays. The exam may be "closed book" or "open book" at the discretion of the advisor.
2. Oral exam: An oral exam is conducted by the Doctoral Guidance Committee and chaired by the advisor. The student should demonstrate mastery of fundamental concepts in the designated areas of specialization, draw upon a broad spectrum of information to answer theoretical and practical questions. There may be focus on any area that was deemed weak in the written exam.

When the student has passed both parts of the qualifying exam, the advisor will inform the Graduate School and recommend that the student be advanced to candidacy in the Ph.D. degree program.

Dissertation and Oral Defense: All students must complete a dissertation reporting original research. After completion of the research, the candidate must provide a copy of the dissertation to the Doctoral Dissertation committee at least two weeks prior to the final oral examination. The final thesis defense consists of two parts: an oral presentation of the research in a public seminar, and an oral defense of the dissertation conducted by the Doctoral Dissertation Committee. Final approval of the dissertation will be determined by a majority vote of the committee.

Number of Credits Required: There is no specific credit requirement for the Ph.D., though students must take the required core courses and fulfill the competencies outlined below. 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.

1. Core Course Requirements:

Code	Title	Credits
ANFS 901	Introduction to Agriculture, Nutrition, and Food Systems Graduate Studies ¹	1
ANFS 997	Agriculture, Nutrition, and Food Systems Seminar ²	1
ANFS 999	Doctoral Dissertation Research ³	0

¹ To be taken at the earliest opportunity, typically in the initial fall semester of the program.

² All students are required to register and participate for a minimum of 3 credits.

³ All students are required to register and participate at least twice, and must be taken after candidacy.

2. Competency Requirements: In addition to the core required courses, students will be expected to demonstrate competency in areas of experimental design and analysis, and in scientific writing and communication. Students must take at least one course from each competency. The competencies may be fulfilled by courses chosen in consultation with the advisor and committee. Depending on the student, one or both of these competency requirements may have been fulfilled through other course work or professional experience as approved by the committee and ANFS graduate coordinator.

Code	Title	Credits
Communication Competency		
Select at least one course from the following:		
BIOL 902	Writing and Publishing Science	
NR 905	Grant Writing	
BIOL 950	Scientific Communication	
Experimental Design and Analysis Competency		
Select at least one course from the following:		
ANFS 933	Design, Analysis, and Interpretation of Experiments	
SOC 902	Sociological Methods II: Research Design	

3. Electives: Each student, in consultation with their graduate committee, will define one or more areas of informal specialization, and will take additional courses appropriate for their area(s) of specialization.

4. Additional Information:

- All students in the Agricultural Sciences Ph.D. Program are expected to present their research in ANFS departmental seminar at least three times (including the defense seminar). Students are also encouraged to present at professional conferences and acquire teaching and/or mentoring experience.

Annual Evaluation: The annual evaluation of graduate students ensures that students receive the mentorship they deserve and are making progress toward completion of their degrees. The annual evaluation of graduate students consists of a collaborative effort between faculty adviser and student to:

- Complete a self-assessment;
- Present a professional quality CV suitable for awards, job applications, and internships;
- Produce a narrative of service or other activities not captured on a CV;
- Develop annual goals.

Discipline specific knowledge

- Identify and explain discipline specific research methods
- Build knowledge and understanding in key areas of agricultural sciences including food systems, and animal and plant-based agricultural production systems

Research design and analysis

- Identify the strengths and weaknesses of study designs utilized in agriculture or food systems research
- Apply appropriate research design to answer a question
- Identify and apply appropriate statistical methods to analyze and interpret research results

Scientific method

- Independently develop, defend, and execute a research idea to advance knowledge in the student's specific field of study

Critical thinking

- Ability to collect and critically evaluate information from the primary research literature to expand knowledge of agricultural and food systems
- Draw conclusions from the literature and make recommendations based on an understanding of the system, scientific evidence, related factors, and desired outcomes
- Develop skills to critically evaluate and analyze their research data

Communication

- Communicate effectively in writing through the development of an argument supported by evidence
- Communicate effectively in oral formats when addressing project-specific research and complex agriculture and food related issues
- Contribute written works to the scientific community in the form of peer-reviewed publications and presentation at scientific conferences

Professionalism

- Conduct research in an ethical manner
- Deliver professional oral and written communications
- Demonstrate collaboration and leadership skills

Student Learning Outcomes

Students graduating with a Ph.D. in Agricultural Sciences will meet objectives in the following areas: