

# ANIMAL SCIENCE

<b>Graduate Program Head</b>	Ramesh Ramachandran
<b>Program Code</b>	ANSC
<b>Campus(es)</b>	University Park (Ph.D., M.S., M.P.S.)
<b>Degrees Conferred</b>	Doctor of Philosophy (Ph.D.) Master of Science (M.S.) Master of Professional Studies (M.P.S.) Dual-Title Ph.D. in Animal Science and Microbiome Sciences
<b>The Graduate Faculty</b>	View ( <a href="https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=ANSC">https://secure.gradsch.psu.edu/gpms/?searchType=fac&amp;prog=ANSC</a> )

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 society by providing companionship, food, fiber, performance, and research. Graduate students may specialize in animal management, breeding, genetics and genomics, growth and developmental biology, meat science, nutrition, reproductive biology, and animal health. The department maintains numerous facilities for research involving both small and large animals. Laboratories are equipped with the latest instrumentation. Herds of dairy and beef cattle, sheep, swine, white tail deer, and horses, as well as flocks of poultry, including chickens, turkeys, and quail, are maintained for instruction and research.

## Admission Requirements

Applicants apply for admission to the program via the J. Jeffrey and Ann Marie Fox Graduate School application for admission (<https://gradschool.psu.edu/admissions/how-to-apply/>). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (<https://gradschool.psu.edu/graduate-education-policies/>).

Prerequisite to graduate work is the completion of an undergraduate major in animal science, dairy science, poultry science, or a related biological science.

Although not required, applicants are strongly encouraged to take the Graduate Record Examinations (GRE). Students with a 3.00 junior/senior grade-point average (on a 4.00 scale) and with appropriate course backgrounds will be considered for admission on a competitive basis.

Exceptions to admission requirements may be made for students with special backgrounds, abilities, and interests.

## Degree Requirements

### Master of Professional Studies (M.P.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-700 Professional Degree Policies (<https://gradschool.psu.edu/graduate-education-policies/>).

A minimum of 30 credits at the 400 or 500 level is required, with a minimum of 18 credits at the 500 level, and at least 6 credits in formal (i.e., non-core) courses in animal agriculture/biological science area at the 500 level in consultation with the student's advisor. In addition, the following Program core courses (credits) are required:

Code	Title	Credits
<b>Required Courses</b>		
ANSC 500	Foundation Readings in Animal Science	2
ANSC 502	Scientific Scholarship (Ethics Offering)	2
ANSC 590	Colloquium	2
ANSC 602	Supervised Experience in College Teaching	1
<b>Culminating Experience</b>		
ANSC 596	Individual Studies (Scholarly Paper)	3

A maximum of 10 credits may be earned in special problem-type courses, which may include up to 3 credits in ANSC 596 for the scholarly paper. The culminating experience for the degree is a scholarly paper completed while the student is enrolled in ANSC 596.

### Master of Science (M.S.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

The academic M.S. program requires a thesis and is designed for those primarily interested in education and research. A minimum of 30 credits at the 400, 500, or 600 level is required. A minimum of 18 credits at the 500 or 600 level, chosen in consultation with the student's advisor, out of which at least 12 credits must be in formal (i.e., non-core) courses in animal agriculture/biological science area with at least 6 of the 12 credits at the 500 level. Students are required to write a thesis, and at least 6 credits in thesis research (ANSC 600 or ANSC 610) must be taken in conjunction with completing the thesis. In addition, the following Program core courses (credits) are required:

Code	Title	Credits
<b>Required Courses</b>		
ANSC 500	Foundation Readings in Animal Science	2
ANSC 502	Scientific Scholarship (Ethics Offering)	2
ANSC 590	Colloquium	2
ANSC 602	Supervised Experience in College Teaching	1
<b>Culminating Experience</b>		
ANSC 600	Thesis Research	6
or ANSC 610	Thesis Research Off Campus	

The thesis must be accepted by the advisers and/or committee members, the head of the graduate program, and the Graduate School, and the student must pass a thesis defense.

### Doctor of Philosophy (Ph.D.)

Requirements listed here are in addition to Graduate Council policies listed under GCAC-600 Research Degree Policies. (<https://gradschool.psu.edu/graduate-education-policies/>)

The academic Ph.D. program requires a dissertation and is designed for those primarily interested in teaching and research. Official entrance into the Ph.D. program occurs upon successful completion of the qualifying examination. Ph.D. degree requirements include successful completion of the following: approved graduate course work, English Competence requirements, a comprehensive examination, and a final oral examination (the dissertation defense). To earn the Ph.D. degree, doctoral candidates must write a dissertation that is accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School. In addition, the following Program core courses (credits) are required:

Code	Title	Credits
<b>Required Courses</b>		
ANSC 500	Foundation Readings in Animal Science	2
ANSC 502	Scientific Scholarship (both the Ethics offering and the Grantsmanship offering)	4
ANSC 590	Colloquium <sup>1</sup>	3
ANSC 602	Supervised Experience in College Teaching	1

<sup>1</sup> Students who completed 2 credits of ANSC 590 as part of an M.S. degree program in Animal Science must take 1 additional credit of ANSC 590 during their Ph.D. program. For students entering the Ph.D. program with an M.S. degree from another institution, one credit of ANSC 590 will be waived; therefore, they will be required to complete 2 credits of ANSC 590 during their Ph.D. program.

## Dual-Titles

### DUAL-TITLE PH.D. IN Animal Science AND Microbiome Sciences

Requirements listed here are in addition to requirements listed in GCAC-208 Dual-Title Graduate Degree Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-208-dual-titles/>).

ANSC Ph.D. students with research and educational interests in Microbiome Sciences may apply for admission to the Microbiome Sciences Dual-Title Degree Program. Students must first apply and be admitted to the ANSC graduate program and The Graduate School before applying for admission to the dual-title program.

The qualifying examination for ANSC will satisfy the qualifying examination requirement for the dual-title degree program in Microbiome Sciences. The application for the dual-title degree program may be completed before or after the qualifying examination in the major program, as long as the application takes place before the end of the fourth semester.

To obtain this dual-title, students must satisfy the degree requirements for the Ph.D. in ANSC, listed in the ANSC Degree Requirements section. In addition, students must complete the degree requirements for the MBIOM dual-title, listed on the Microbiome Sciences Bulletin page (<http://bulletins.psu.edu/graduate/programs/majors/biogeochemistry/>). Students must complete a total of 15 credits including 2 credits of MBIOM 550 (<https://bulletins.psu.edu/university-course-descriptions/graduate/mbiom/>) and at least 13 credits chosen in consultation with the adviser from an approved list of courses, with at least 3 credits in each of the following areas: Microbial Sciences, Ecology and Evolution, and Bioinformatics and Research Tools. Eight of the 15 total credits must be taken at the 500-level. No more than six of the 15 total credits can be offered by the ANSC program.

In addition to the general Graduate Council requirements for Ph.D. committees (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-600/gcac-602-phd-committee-formation/>), the Ph.D. committee of a ANSC and Microbiome Sciences dual-title Ph.D. student must include at least one member of the Microbiome Sciences Graduate Faculty. Faculty members who hold appointments in both programs' Graduate Faculty may serve in a combined role. If the chair of the Ph.D. committee is not also a member of the Graduate Faculty in Microbiome Sciences, the member of the committee representing Microbiome Sciences must be appointed as co-chair. The

Microbiome Sciences representative on the student's Ph.D. committee will develop questions for and participate in the evaluation of the comprehensive examination.

Students in the dual-title program are required to write and orally defend a dissertation on a topic that is approved in advance by their Ph.D. committee and reflects their original research and education in Animal Science and Microbiome Sciences. Upon completion of the doctoral dissertation, the candidate must pass a final oral examination (the dissertation defense) to earn the Ph.D. degree. The dissertation must be accepted by the Ph.D. committee, the head of the graduate program, and the Graduate School.

## Minor

A graduate minor is available in any approved graduate major or dual-title program. The default requirements for a graduate minor are stated in Graduate Council policy GCAC-218 Minors (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-218-minors/>).

## Student Aid

Graduate assistantships available to students in this program and other forms of student aid are described in the Tuition & Funding (<https://gradschool.psu.edu/funding/>) section of the J. Jeffrey and Ann Marie Fox Graduate School's website. Students on graduate assistantships must adhere to the course load limits (<https://gradschool.psu.edu/graduate-education-policies/gsad/gsad-900/gsad-901-graduate-assistants/>) set by the Fox Graduate School.

## Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Animal Science (ANSC) Course List (<https://bulletins.psu.edu/university-course-descriptions/graduate/ansc/>)

## Learning outcomes

### Master of Professional Studies (M.P.S.)

- KNOW:** Students will demonstrate appropriate breadth and depth of disciplinary knowledge in animal science (e.g., livestock production and management), a command of the current animal agricultural industrial practices, and a thorough understanding of the problems related to livestock production.
- APPLY/CREATE:** Students will apply current knowledge in their field to analyze problems and create solutions to improve animal production or welfare.
- COMMUNICATE:** Students will effectively communicate their research findings, both in writing a research paper and by seminars, oral or poster presentations, to peers, advisors/mentors, and other scholars and/or stakeholders in their specialty field or beyond their discipline.
- THINK:** Students will be able to conceptualize and critically evaluate the work of others in their field.
- PROFESSIONAL PRACTICE:** Students will be able to identify ethical issues in animal agriculture industry, will become familiar with University policies involving the use of animals and human subjects

in research, will act ethically and exhibit collegiality with other professionals within or outside of their field.

## Master of Science (M.S.)

1. **KNOW:** Students will demonstrate appropriate breadth and depth of disciplinary knowledge (e.g., nutrition, physiology, statistics, etc.), a command of the current literature relating to their thesis project.
2. **APPLY/CREATE:** Students will apply current knowledge in their field and learn to design animal studies and/or perform laboratory methods or other techniques to address their research problems.
3. **COMMUNICATE:** Students will effectively communicate their research findings via seminars and poster presentations.
4. **THINK:** Students will be able to conceptualize and critically evaluate the work of others in their field.
5. **PROFESSIONAL PRACTICE:** Students will be able to identify ethical issues in research, will become familiar with University policies involving the use of animals and human subjects in research, will act ethically and exhibit collegiality with other professionals within or outside of their field.

## Doctor of Philosophy (Ph.D.)

1. **KNOW:** Students will demonstrate appropriate breadth and depth of disciplinary knowledge (e.g., nutrition, physiology, statistics, etc.), a command of the current literature relating to their thesis project, and a thorough understanding of the problems that their research addresses.
2. **APPLY/CREATE:** Students will apply current knowledge in their field to design animal studies and/or perform laboratory methods or other techniques to address their research problems, while generating and testing new ideas or hypotheses that provide solutions to those problems.
3. **COMMUNICATE:** Students will effectively communicate their research findings, both in writing, via abstracts and manuscripts, and orally, via seminars and oral or poster presentations, to peers, advisors/mentors, and other scholars and/or stakeholders in their specialty field or beyond their discipline.
4. **THINK:** Students will be able to conceptualize and critically evaluate the work of others in their field.
5. **PROFESSIONAL PRACTICE:** Students will be able to identify ethical issues in research, will become familiar with University policies involving the use of animals and human subjects in research, will act ethically and exhibit collegiality with other professionals within or outside of their field, and will engage in service to the profession and to society.

## Contact

<b>Campus</b>	University Park
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