Animal, Food, and Nutrition Sciences, Ph.D.

Christopher Ashwell, Division Director of Animal and Nutritional Sciences  
e-mail: christopher.ashwell@mail.wvu.edu

Sven Verlinden, Interim Division Director of Plant and Soil Sciences  
e-mail: sverlind@wvu.edu

Degree Offered

- Doctor of Philosophy

Nature of the Program

The Davis College of Agriculture, Natural Resources, and Design offers graduate studies leading to the degree of doctor of philosophy in agricultural sciences with a major in Animal and Food Science. The objective of the degree program is to provide doctoral students an opportunity to study and conduct research with faculty in areas of excellence within the college. Students entering this program may select research and classes in areas of emphases including: agricultural biochemistry, animal nutrition, animal physiology, and production management.

Admissions

Applicants must hold a master’s or its equivalent to be eligible for admission into the program. The following admission and performance standards are normally required in the Ph.D. in Agriculture Sciences program:

- An applicant must possess a master’s degree and hold a grade point average (GPA) of 3.0 or above (on a 4.0 scale) in postgraduate courses.
- The graduate record examination is required for the major in plant and soil sciences but not for the major in animal and food sciences.
- International students must meet WVU’s minimum score requirement for English language proficiency. ([https://graduateadmissions.wvu.edu/how-to-apply/apply-for-2022-2023/international-graduate-applicant/](https://graduateadmissions.wvu.edu/how-to-apply/apply-for-2022-2023/international-graduate-applicant/))
- An applicant must provide three letters of reference.
- A one or two-page letter of intent from the student describing his/her research and professional aspirations is required.

After a student is admitted into the doctoral program, the student will select a major professor who will provide and direct an appropriate research opportunity. Doctoral students will conduct research in support of projects approved by the West Virginia Agricultural and Forestry Experiment Station (WVAFES) or externally funded grants. The student in consultation with the major professor will select a graduate committee within the first semester of study. The committee will consist of five or more members; the majority must be WVU faculty and at least one member representing a discipline outside the college. Each student and his or her committee will formulate a plan of study, which will be filed in the Office of the Associate Dean for Academic Affairs of the College. WVU regulations concerning committee membership will apply.

Admission Requirements 2023-2024

The Admission Requirements above will be the same for the 2023-2024 Academic Year.

Major Code: 0749

A candidate for the Ph.D. degree in Animal, Food, and Nutrition Sciences must meet all University, College, Division, and Program requirements as outlined in the WVU Graduate catalog.

Program Requirements

All Ph.D. degree candidates are required to follow a planned program of study. The student develops the plan of study during their first year in the program in conjunction with the graduate committee. The plan must be approved by the Director of the Division and the Associate Dean for Academic Affairs of the Davis College.

A minimum cumulative GPA of 3.0 is required in all courses applied toward degree requirements.

Course Requirements as determined by the Plan of Study

Research Candidacy Exam Dissertation Dissertation Defense

Doctoral students must satisfactorily complete a set of core courses before they will be admitted to candidacy for the Ph.D. degree. Certain course requirements may be waived if the student has received equivalent training in prior coursework. Additional coursework pertaining to the student’s area
of specialization will be determined by the student’s major professor and graduate committee. Although not required, presentation of research results at meetings of a professional society and submission of manuscripts for publication are encouraged.

* Students are expected to be involved in research throughout their graduate career, and enrollment in A&VS 797 Research, should reflect this activity. Most students complete an average of 45 credit hours of research.

**Major Learning Outcomes**

**ANIMAL AND FOOD SCIENCE**

The student demonstrates fundamental knowledge of plants, soils, natural sciences, microorganisms, macroorganisms, pathogens and associated fields such as biochemistry, chemistry, and biology.

The student demonstrates detailed knowledge of their particular subdiscipline or research area, including the scientific literature fundamental to their discipline and the ability to stay current on scientific literature.

The student demonstrates technical skills in the laboratory.

The student demonstrates the ability to communicate in writing and orally about scientific concepts and the results of their research.

**AGRICULTURAL BIOCHEMISTRY COURSES**

**AGBI 512L. Nutritional Biochemistry Laboratory. 1 Hour.**
PR: AGBI 410 and AGBI 410L and PR or CONC: AGBI 512. Experiments to determine the nutritional constituents in animal and plant tissues.

**AGBI 514L. Animal Biotechnology Laboratory. 0 Hours.**
PR: Corequisite of AGBI 514. Animal Biotechnology - AGBI 514 Laboratory.

**AGBI 591. Advanced Topics. 1-6 Hours.**
PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

**AGBI 592. Directed Study. 1-6 Hours.**
Directed study, reading, and/or research.

**AGBI 593. Special Topics. 1-6 Hours.**
A study of contemporary topics selected from recent developments in the field.

**AGBI 594. Seminar. 1-6 Hours.**
Special seminars arranged for advanced graduate students.

**AGBI 595. Independent Study. 1-9 Hours.**
Faculty-supervised study of topics not available through regular course offerings.

**AGBI 610. General Biochemistry. 4 Hours.**
PR: 8 hours of Organic Chemistry. The first half of a general course of biochemistry designed for graduate students of biological sciences. The course emphasizes the chemical properties of cellular constituents.

**AGBI 612. General Biochemistry. 4 Hours.**
PR: AGBI 610 or Consent. The second half of a general course of biochemistry designed for graduate students of biological sciences. The course emphasizes reactions and control of intermediary metabolism.

**AGBI 690. Teaching Practicum. 1-3 Hours.**
PR: Consent. Supervised practice in college teaching of agricultural biochemistry. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

**AGBI 691. Advanced Topics. 1-6 Hours.**
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

**AGBI 692. Directed Study. 1-6 Hours.**
Directed study, reading, and/or research.

**AGBI 693. Special Topics. 1-6 Hours.**
A study of contemporary topics selected from recent developments in the field.

**AGBI 694. Seminar. 1-6 Hours.**
Special seminars arranged for advanced graduate students.

**AGBI 695. Independent Study. 1-9 Hours.**
Faculty-supervised study of topics not available through regular course offerings.
AGBI 696. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

AGBI 697. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

AGBI 698. Thesis or Dissertation. 1-6 Hours.
PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

AGBI 699. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University’s facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department’s 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

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Directed study, reading, and/or research.

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AGBI 795. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

AGBI 796. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

AGBI 797. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis (697), problem report (697), research paper or equivalent scholarly project (697), or a dissertation (797). (Grading may be S/U.).

ANIMAL NUTRITION COURSES

ANNU 591. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

ANNU 592. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

ANNU 593. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

ANNU 594. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

ANNU 595. Independent Study. 1-9 Hours.
Faculty-supervised study of topics not available through regular course offerings.

ANNU 601. Principles of Nutrition and Metabolism. 3 Hours.
PR: AGBI 410 or consent. A basic course in principles of nutrition with emphasis on the major classes of dietary nutrients and their digestion and utilization.

ANNU 602. Nutrition and Physiological Function. 3 Hours.
PR: ANNU 601 or Consent. Sequence to ANNU 601. Techniques used in nutritional studies and the relationship of nutrient requirements to physiological function in species of laboratory and domestic animals and man.

ANNU 690. Teaching Practicum. 1-3 Hours.
PR: Consent. Supervised practice in college teaching of animal nutrition. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.)

ANNU 691. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

ANNU 692. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.
ANNU 693. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

ANNU 694. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

ANNU 695. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

ANNU 696. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

ANNU 697. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U).

ANNU 698. Thesis or Dissertation. 1-6 Hours.
PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

ANNU 699. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University’s facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department’s 699/799 Graduate Colloquium package with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for master’s programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

ANIMAL PHYSIOLOGY COURSES

ANPH 591. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation in advanced topics that are not covered in regularly scheduled courses.

ANPH 592. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

ANPH 593. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

ANPH 594. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

ANPH 595. Independent Study. 1-9 Hours.
Faculty-supervised study of topics not available through regular course offerings.

ANPH 675. Reproduction Colloquium. 1 Hour.
PR: Graduate standing. Weekly discussions by graduate students and faculty in reproductive physiology program of current literature in the field, particularly of mammalian species.

ANPH 691. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

ANPH 692. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

ANPH 693. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

ANPH 694. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

ANPH 695. Independent Study. 1-9 Hours.
Faculty-supervised study of topics not available through regular course offerings.

ANPH 696. Graduate Seminar. 1 Hour.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

ANPH 697. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U).

ANPH 698. Thesis or Dissertation. 1-6 Hours.
PR: Consent. This is an optional course for programs that wish to provide formal supervision is needed during the writing of student reports (698), theses (698), or dissertations (798). (Grading is Normal).
ANPH 699. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium, to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is Normal; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

ANPH 726. Endocrinology of Reproduction. 4 Hours.
(2 labs) PR: ANPH 424 or BIOL 413 or equivalent. Discussion of and laboratory experience in classical and current concepts of hormonal and neurohormonal regulations of reproductive phenomena with emphasis on species differences and similarities.

ANPH 790. Teaching Practicum. 1-3 Hours.
PR: Consent. Supervised practice in college teaching of animal physiology. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

ANPH 791. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

ANPH 792. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

ANPH 793. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

ANPH 795. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

ANPH 796. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

ANPH 797. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

ANIMAL AND VETERINARY SCIENCE COURSES

A&VS 591. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

A&VS 592. Directed Study. 1-6 Hours.
Directed Study, reading, and/or research.

A&VS 593. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

A&VS 594. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

A&VS 595. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

A&VS 690. Teaching Practicum. 1-3 Hours.
PR: Consent. Supervised practice in college teaching of agriculture, forestry, and consumer science. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It also provides a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

A&VS 691. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

A&VS 692. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

A&VS 693. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

A&VS 694. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

A&VS 695. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.
A&VS 696. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

A&VS 697. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

A&VS 698. Thesis or Dissertation. 1-6 Hours.
PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

A&VS 699. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use of the University's facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department's 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.

A&VS 791. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

A&VS 792. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

A&VS 793. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

A&VS 795. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

A&VS 796. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

A&VS 797. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or dissertation. (Grading may be S/U.).

FOOD SCIENCE TECHNOLOGY COURSES

FDST 545L. Food Microbiology Laboratory. 1 Hour.
PR or CONC: FDST 545. Laboratory training in methods used in microbiological examination of foods. This laboratory will provide hands-on experience for students who take or have taken FDST 545.

FDST 595. Advanced Muscle Foods. 3 Hours.
PR: FDST 365 and FDST 367. Theoretical and experimental aspects of muscle food science, muscle food production/process systems, and the quantitative biology of muscle systems used for food.

HUMAN NUTRITION AND FOODS COURSES

HN&F 505. Dietetic Supervised Practice 1. 1-3 Hours.
PR: Instructor approval and acceptance into the Dietetic Internship is required. This course provides an introduction to supervised practice recognized by the Accreditation Council on Education for Nutrition & Dietetics (ACEND) at WVU. Practicum preceptors, sites and intern obligations will be reviewed. Interns will be required to develop social media portfolio to document their supervised practice experience.

HN&F 512. Maternal and Child Nutrition. 3 Hours.
PR: Consent. Physiological changes and nutritional requirements during pregnancy and lactation. Effects of growth and development on nutritional requirements during infancy, childhood and adolescence.

HN&F 590. Teaching Practicum. 1-3 Hours.
PR: Consent. Supervised practice in college teaching of human nutrition and foods. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading will be S/U.).

HN&F 591. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

HN&F 592. Directed Study. 1-6 Hours.
Directed study, reading and/or research.
HN&F 593. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

HN&F 610. Nutrition and Fitness. 3 Hours.
PR: HN&F 171 or equivalent. Upon completion of this course the student will understand the physiological and metabolic changes that occur during physical activity and the ways in which those changes alter nutritional requirements.

HN&F 614. Nutrition/Disease Prevention. 3 Hours.
This graduate level course covers the role of nutrition in the pathophysiology of chronic diseases, critical analysis, and translation of research into dietary recommendations for the prevention/treatment of chronic diseases.

HN&F 670. Human Nutrition Concepts and Application. 3 Hours.
PR: HN&F 460 or equivalent, and consent. Critical study of the nutrient evaluation methods and the nutrient requirements of the human in health and disease, and scope of its application.

HN&F 691. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

HN&F 692. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

HN&F 693. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

HN&F 695. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

HN&F 696. Graduate Seminar. 1-3 Hours.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

HN&F 697. Research. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U).

HN&F 699. Graduate Colloquium. 1-6 Hours.
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HN&F 900. Professional Development. 1-6 Hours.
Professional development courses provide skill renewal or enhancement in a professional field or content area (e.g., education, community health, geology). These continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.

HN&F 930. Professional Development. 1-6 Hours.
Professional development courses provide skill renewal or enhancement in a professional field or content area (e.g., education, community health, geology). These tuition-waived continuing education courses are graded on a pass/fail grading scale and do not apply as graduate credit toward a degree program.