Reproductive Physiology, M.S.

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

Degrees Offered

• Master of Science

Nature of the Program

The graduate program in reproductive physiology is interdisciplinary with faculty located in the Division of Animal and Nutritional Sciences and the Departments of Obstetrics and Gynecology, Physiology and Pharmacology, and Internal Medicine.

Research topics include studies of the control of fertility, function, and regression of the corpus luteum, aging of the oocyte, seasonal and other environmental factors in reproduction, steroidogenesis, control of estrus and ovulation, artificial insemination, ovarian follicular development, novel ovarian genes, endocrine functions of polypeptides, embryonic and fetal mortality, neuroendocrine control of gonadotropic hormone secretion, neuroendocrine regulation of puberty and breeding seasons, effects of nutrition on reproductive function, and immunology of reproduction. The focus of research is both basic and applied and is almost entirely with farmed animals.

Admissions

Requirements are similar to those in other biological sciences. The student should have completed basic courses in the physical and biological sciences, including genetics, nutrition, and physiology. Deficiencies may prolong the time needed to complete degree programs.

A regular graduate student is a degree-seeking student who meets all the criteria for regular admission to a program of their choice and be under no requirements to make up deficiencies.

For regular admission, a student must:

• Possess a baccalaureate degree from a college or university and have at least a grade point average of 2.75 on a 4.0 scale (or an average of 3.0 or higher for the last sixty credit hours).
• Provide three letters of reference from persons acquainted with the applicant’s professional work, experience, or academic background.
• Submit a written statement of 500 words or more indicating the applicant’s goals and objectives relative to receiving a graduate degree, and identify a potential faculty advisor.
• Have an adequate academic aptitude at the graduate level as measured by the Graduate Record Examination (GRE) or the New Medical College Admissions Test (New MCAT).

* International students have the additional requirement to submit a minimum score of 550 on the paper TOEFL examination or 213 on the electronic TOEFL examination if their native language is not English.

Requirements for admission include completion of the following prerequisites with a grade of C or better in each: calculus, genetics, organic chemistry, physics, and vertebrate embryology.

Admission Requirements 2023-2024

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

Major Code: 0753

A candidate for the M.S. degree in Reproductive Physiology must meet all University, College, Division, and Program requirements as outlined in the WVU Graduate Catalog.

Program Requirements

All M.S. and 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

Course Requirements as determined by the Plan of Study *

<table>
<thead>
<tr>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
</tr>
</tbody>
</table>
Students must complete a minimum of 30 total hours, of which at least 24 hours must be coursework other than research, thesis, project, internship, etc. credits.

COURSES

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANPH 424</td>
<td>Physiology of Reproduction</td>
<td>3</td>
</tr>
<tr>
<td>STAT 511</td>
<td>Statistical Methods 1</td>
<td></td>
</tr>
<tr>
<td>BIOS 601</td>
<td>Applied Biostatistics 1</td>
<td></td>
</tr>
<tr>
<td>STAT 512</td>
<td>Statistical Methods 2</td>
<td></td>
</tr>
<tr>
<td>BIOS 603</td>
<td>Applied Biostatistics 2</td>
<td></td>
</tr>
<tr>
<td>&amp; BIOS 604</td>
<td>and Applied Biostatistics 3</td>
<td></td>
</tr>
<tr>
<td>ANPH 796</td>
<td>Graduate Seminar</td>
<td>1</td>
</tr>
<tr>
<td>A&amp;VS 697</td>
<td>Research</td>
<td>1</td>
</tr>
</tbody>
</table>

Other graduate classes based on student emphasis and advisory committee recommendations.

BIOL, AGBI, ANPH, PHAR, IMMB, PSIO, GEN, AEM, A&VS, ANNU, VETS

Total Hours 30

Students present seminars and participate in Graduate Colloquium (Journal Club) each semester, but only one hour can count toward the degree. The following can count toward the 30 hour minimum: one (1) hour of Seminar, one (1) hour of Graduate Colloquium (Journal Club), and six (6) hours of Research.

The program draws on courses offered in various departments and includes courses in endocrinology, advanced reproductive physiology, biochemistry, physiology, statistics, and developmental embryology selected by the student in consultation with his or her graduate committee.

Major Learning Outcomes

REPRODUCTIVE PHYSIOLOGY

- Knowledge of the reproductive system and its functions in animals and man.
- Knowledge of the endocrine and neuroendocrine regulation of reproduction.
- Knowledge of the effects of reproduction on the organism and the roles of endocrine secretions of reproductive organs on bodily functions.
- Ability to think comprehensively in the field of reproductive biology, design, analyze, interpret and report results of experiments to increase knowledge of the field.
- Ability to utilize knowledge of reproductive biology to teach the subject and some associated disciplines at multiple levels.
- Ability to understand and critique current research publications relevant to the control of reproduction and relate these results to previous work in the field.

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 schedules 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.

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

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

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

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 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.

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 insire 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 794. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

ANPH 795. 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 796. 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.).