

Graduate Studies in Animal Science with an Endocrinology-Reproductive Physiology Emphasis

General Statement

The endocrinology-reproductive physiology area ranges from hormonal studies with livestock, primates, and laboratory animals to biochemical studies at the cellular level. These studies include mechanism of gene action, physiological genetics, in vitro maturation, fertilization, embryo development, cloning and gene transfer, neuroendocrinology, and the environmental and genetic control of puberty and postpartum anestrus. Courses are available through the departments of the College of Agriculture and Life Sciences, the Medical School, School of Pharmacy and Veterinary School.

Faculty Research Interests

Neal First, Ph.D. Fertilization and mechanism preparing sperm and egg for fertilization; embryo development; transfer of genes into and cloning of embryos. nlf@facstaff.wisc.edu

John Parrish, Ph.D. The goal of the Parrish lab is to understand why males differ in fertility. The experimental model used is the bovine as this is the only species with extensive quantitative fertility data available. Several approaches are being used to determine why bulls differ in fertility. One approach is to examine the mechanisms of sperm capacitation focusing on the regulation of intracellular calcium, pH and amp within sperm. Another approach has been to examine how bovine sperm interact with oviduct cells in vitro to induce capacitation and maintain sperm viable for extended lengths of time. The third approach is to examine how sperm nuclear shape is related to fertility. In this approach novel methods have been developed to quantify sperm nuclear shape with Fourier Harmonic Analysis. The last approach is to examine how scrotal insulation affects in vitro fertility of sperm and its relationship with changes in sperm nuclear shape and the biochemical regulation of capacitation. parrish@calshp.cals.wisc.edu

Bernard Wentworth, Ph.D. Investigation of basic hormonal interactions in avian reproductive physiology, with emphasis on embryonic gonadal differentiation; determination of the role some environmental factors have on avian reproduction; studies on donor genome sexual expression in the F1 generation from surrogates hosting transgenic primordial germ cell grafts. wentworth@calshp.cals.wisc.edu

Application to the Graduate School

Admission Requirements

As you apply to UW-Madison, you need to be aware of two different sets of requirements:

(1) Graduate School minimum admission requirements, and (2) department admission requirements.

(1) The Graduate School sets the minimum admission requirements for all prospective graduate students. The minimum admission requirements are:

- A bachelor's degree from an approved (accredited) institution.
- A minimum undergraduate grade-point average (GPA) of 3.00 (on a 4.00 scale) on the equivalent of the last 60 semester hours (approximately two years of work).
- Every applicant whose native language is not English, or whose undergraduate instruction was not in English, must provide official scores from the Test of English as a Foreign Language (TOEFL) or the Michigan English Language Assessment Battery (MELAB).
 - An admitted applicant whose TOEFL (paper-based) test score is below 580; TOEFL computer-based test (CBT) score below 237; or MELAB below 82 must take an English assessment test upon arrival. You must then register for any recommended English as a Second Language (ESL) course(s) in the first semester you are in enrolled.
- International applicants must have a degree comparable to an approved U.S. bachelor's degree and provide evidence of adequate financial resources for the anticipated duration of their program.

Department Requirements

(2) Departmental admission requirements are in addition to the minimum requirements set by the Graduate School. The Department of Animal Sciences bases its admission on demonstrated scholastic ability, recent GRE (Graduate Record Exam) scores, letters of recommendation, and the personal statement or reasons for graduate study. Prospective students are strongly encouraged to contact faculty members they are interested in working with during the admissions process.

M.S. Animal Sciences with an Emphasis in Endocrinology-Reproductive Physiology

Prerequisites for Admission

1. Physics
2. Calculus
3. Organic Chemistry
4. Genetics
5. Physiology

Curriculum Requirements

A master's degree requires a minimum of 16 graduate-level credits (300 level or above, no audits or pass/fail) taken as a graduate student at UW-Madison.

Core Course Requirements which require a minimum grade of a "B" or better. Select one course from each section A, B and C.

- A. Statistics 571- Statistical Methods for Bioscience I. (4 Cr.)
- B. Animal Science 875- Endocrine Physiology (3 cr.) **or**
Biochemistry 630- Cellular Signal Transduction Mechanisms. (3 Cr.)

- C. Biomolecular Chemistry 503- Human Biochemistry (3cr.) **or**
Biomolecular Chemistry 704- Comprehensive Human Biochemistry (6 Cr.) **or**
Biochemistry 507 & 508- General Biochemistry (6 Cr.)

Additional Course Requirements which require a minimum grade of a “B” or better.

- D. Advanced Biochemistry
E. Animal Science 954- Endocrinology-Reproductive Physiology Seminar
F. Technical Writing
G. Advanced Statistics
H. Advanced Endocrinology
I. Advanced Reproduction
J. Advanced Topic Course (Select 1 course)
 - Gamete and Embryo Biology (2 Cr.)
 - Reproductive Patterns (2 Cr.)
 - Selected Topics in Endocrinology-Reproductive Physiology (2 Cr.)
 - Pregnancy, Parturition, and Lactation (2 Cr.)

K. Animal Science- 799 Teaching Practicum
L. Animal Science 990- Research Credits
M. Other courses per the Certification Committee

A typical M.S. degree in this area can be completed in 2 ½ years with full-time enrollment.

PhD in Animal Sciences with an Emphasis on Endocrinology-Reproductive Physiology

Prerequisites for Admission

1. Physics
2. Calculus
3. Organic Chemistry
4. Genetics
5. Physiology

Curriculum Requirements

A Ph.D. degree requires 32 graduate-level credits (300 level or above, no audits or pass/fail) taken as a graduate student at UW-Madison.

Core Course Requirements which require a minimum grade of a “B” or better. Select one course from each section A, B and C.

- A. Statistics 571- Statistical Methods for Bioscience I. (4 Cr.)
- B. Animal Science 875- Endocrine Physiology (3 cr.) **or**
Biochemistry 630- Cellular Signal Transduction Mechanisms. (3 Cr.)
- C. Biomolecular Chemistry 503- Human Biochemistry (3cr.) **or**
Biomolecular Chemistry 704- Comprehensive Human Biochemistry (6 Cr.) **or**

Biochemistry 507 & 508- General Biochemistry (6 Cr.)

Additional Course Requirements which require a minimum grade of a “B” or better.

- D. Advanced Biochemistry
- E. Animal Science 954- Endocrinology-Reproductive Physiology Seminar
- F. Technical Writing
- G. Advanced Statistics
- H. Advanced Endocrinology
- I. Advanced Reproduction
- J. Advanced Topic Course (Select 2 courses)
 - Gamete and Embryo Biology (2 Cr.)
 - Reproductive Patterns (2 Cr.)
 - Selected Topics in Endocrinology-Reproductive Physiology (2 Cr.)
 - Pregnancy, Parturition, and Lactation (2 Cr.)
- K. Animal Science- 799 Teaching Practicum
- L. Animal Science 990- Research Credits
- M. Other courses per the Certification Committee

Students can typically earn a PhD in this area in 4.5 years with full-time study.

Financial Support

Opportunities for financial support may be available. Prospective students should discuss this directly with faculty members they are interested in working with. The Graduate School also administers fellowships for minority and other educationally disadvantaged students as well as maintains a listing of other fellowship/scholarship opportunities. Contact the Student Services Coordinator for more information.