**BIOL/POUL 4060/6060**
Spring 2022
Reproductive Endocrinology

Course Description: The principles of reproductive endocrinology will be taught using the bird as a model species. Research findings from humans and farm animal species will also be utilized to provide the most complete and current information on the hormonal control of reproduction. Emphasis will be placed on follicular development, spermatogenesis, fertilization, endocrine disruptors, sex determination and selection, sexual differentiation, and embryology.

Lectures: MWF 12:40 - 1:30 in room 319 of the Poultry Science Building

Instructor:
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Teaching Assistants:
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Suggested Text: None

Credit: 3 hours

Prerequisite: BIOL 1108-1108L

Grading:

| | Undergraduate* | Graduate |
|---|---|---|
| 1st preliminary exam | 20% | 20% |
| 2nd preliminary exam | 25% | 20% |
| 3rd preliminary exam | 25% | 20% |
| Final exam | 30% | 30% |
| Paper | 0% | 10% |

*Undergraduates can choose the graduate grading option if they wish

Letter grades:

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|---|---|---|---|
| 94-100 | A | 72.5-75.9 | C |
| 89-93.9 | A- | 69-72.4 | C- |
| 86-88.9 | B+ | 59-68.9 | D |
| 82.5-85.9 | B | <59 | F |
| 79-82.4 | B- | | |
| 76-78.9 | C+ | | |

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|---|---|---|
| Exam Dates: | 1st preliminary exam | February 9, 2022 (take home*) |
| | 2nd preliminary exam | March 2, 2022 (take home*) |
| | 3rd preliminary exam | April 6, 2022 (take home*) |
| | Final exam | May 11, 2022 (in class, noon to 3 pm) |

*Take home exams will be due at the start of class on the Monday after they are given out. Thus, exam 1 is due February 14th, exam 2 is due March 14th, exam 3 is due April 11th

Graduate students: Term paper on a reproductive topic of your choice. Minimum of 12 pages in length double spaced. Due May 9, 2022.

**Course Topical Outline:**

I. Basic principles of endocrinology, research methodology
II. Hypothalamus/pituitary/ovary axis
- A. Role of nutrition in sexual maturation
  1. Leptin
  2. Ghrelin
  3. Other hormones involved
- B. Environmental cues to reproduction
  1. Types of cues
  2. Temperate vs. tropical bird species
  3. Photoperiod
     a. Absolute vs. relative photorefractoriness
- C. Hypothalamus and LHRH
- D. Pituitary hormones (LH, FSH, mesotocin and vasotocin)
- E. Ovary
  1. Ovarian development
  2. Follicular structure
  3. Yolk synthesis
  4. Hormones produced and their function
     a. Steroidogenesis
  5. Follicular atresia
     a. Apoptosis
  6. Follicular hierarchy and follicular development
     a. Hormone maintenance
- F. Negative and positive hormone feedback mechanisms
- G. Ovulation
  1. Mechanisms for timing
  2. Hormonal regulation

III. Male reproductive physiology
- A. Avian vs. mammalian sex differentiation
- B. Maturation until sexual maturity
- C. Testes
  1. Anatomy and physiology

a. Accessory organs
2. Hormonal control of maturation
3. Spermatogenesis
a. Hormones involved
b. Sperm morphology
c. Duration

D. Semen characteristics
E. Semen analysis
F. Biology behind the lack of a copulatory organ in most birds
G. Endocrine disrupters
1. What are they?
2. Mode of action
3. Examples

IV. Fertilization
A. Sperm storage in oviduct
1. Why it is physiologically necessary
2. Sperm storage tubules and their physiology
3. Sperm selection by female
B. Perivitellin membrane proteins
C. Syngamy and the acrosome reaction
D. Sex determination and selection
E. Sexual differentiation

V. Egg formation and expulsion
A. Oviduct sections and their function
B. Components of the egg and their function
1. Microbial considerations
2. Practical considerations

VI. Biology of egg clutch size

VII. Biology of incubation
A. Strategies of incubation
B. Hormonal control of incubation
C. Metabolism and use of body reserves
D. Artificial incubation
1. Egg storage
2. Incubator conditions

VIII. Hatching biology
A. Synchronous vs. asynchronus
B. Precocious vs. altricial

IX. Embryology
A. Gastrulation
B. Development of extraembryonic membranes
C. Formation of the circulatory system and other major organs