2018 - ANS 6702
Physiology of the Mammary Gland and Lactation

Instructor:
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Time and Location: MW; 10:40 - 11:30 am; 2250 Shealy Drive, Room 102 (Animal Sciences Bldg.)

Course description
Prerequisites: ANS 6704 (Mammalian Endocrinology) or permission from advisor.
This course will offer insights into the endocrinology and physiology of the defining characteristics of mammals: the mammary gland and lactation, focusing on the anatomy and development of the mammary gland with an overview of the biochemical, cellular and molecular processes controlling lactation emphasizing on livestock species. (2 credits)

Course learning objectives and expected outcomes
Upon completion of the course, the student will be able to:
1. Describe the anatomy and physiology of the mammary gland.
2. Outline the prenatal development of the mammary gland and its changes throughout the lactation cycle controlled by systemic (hormonal) and local (autocrine/paracrine) mechanisms.
3. Discuss the physiological, biochemical, cellular and molecular processes controlling the process of milk formation, milk ejection and factors affecting milk yield.
4. Distinguish the major components of mammalian milk and their functions for the neonate.
5. Apply learned concepts to critically evaluate management issues related to lactation in farm animals.
6. Read, interpret and discuss scientific articles relating to mammary gland biology.

Recommended reading material and text books
There is no assigned textbook for this class. The following reading materials are recommended for the students’ consultation:
- Lactation Biology Website: University of Illinois (access link here)
- Lactation on the NIH website (access link here)
- Weaver and Hernandez (2015) Autocrine-paracrine regulation of the mammary gland

Course website – Canvas. Power point lectures, reading materials, syllabus, homework and grades will be available in Canvas: http://elearning.ufl.edu/.
Course Schedule

**Week 1.** August W 22: Course overview & introduction to lactation physiology

**Week 2.** August M 27: Mammary anatomy I: *macrostructure*
August W 29: Mammary anatomy II: *microstructure (secretory cell and organelles)*

**Week 3.** Sept M 3: Holiday (no class)
Sept W 5: Mammary anatomy III: *circulatory, lymphatic and neural systems*

**Week 4.** Sept M 10: Mammary growth and development I: *fetal through puberty*
Sept W 12: Mammary growth and development II: *Post-puberty through involution*

**Week 5.** Sept M 17: Neuro-endocrine control of lactation
Sept W 19: Colostrum and milk composition

**Week 6.** Sept M 24: Review section I
**Sept W 26: Mid-term I**

**Week 7.** Oct M 1: Milk carbohydrate synthesis and secretion
Oct W 3: Milk protein synthesis and secretion

**Week 8.** Oct M 8: Milk lipids synthesis and secretion
Oct W 10: Lactogenesis

**Week 9.** Oct M 15: Galactopoiesis
Oct W 17: Involution

**Week 10.** Oct M 22: Presentations I: “My favorite mammal”
Oct W 24: Presentations II: “My favorite mammal”

**Week 11.** Oct M 29: Review section II
**Oct W 31: Mid-term II**

**Week 12.** Nov M 5: Seven Habits of successful milking routines
Nov W 7: Mammary gland immunology & Mastitis

**Week 13.** Nov M 12: Holiday (no class)
Nov W 14: Factors affecting milk yield: Manipulation of Milk Production

**Week 14.** Nov M 19: Farm Visit - University of Florida Dairy Unit
Nov W 21: Holiday (no class)

**Week 15.** Nov M 26: Graduate students’ debate I
Nov W 28: Graduate students’ debate II

**Week 17.** Dec M 3: Review section III
**Dec W 5: Mid-term III**

Debate topics: organic vs. conventional dairy farming, skim vs. whole milk consumption, robotic vs. conventional milking, plant vs animal based “milk”, among others.
Grades

Students can earn a maximum of **475 pts**. The final grade will be based on: three mid-terms (100 pts each), an oral presentation (25 pts), a short assay or paper (50 pts), a debate presentation (50 pts), and 10 homework assignments through the course (50 pts).

**Presentation format:** 8-10 min., topic: “Your favorite mammal”. One mid-term question will be formulated with the content of these presentations (rubrics will be provided).

**Essay:** short paper on a chosen mammal’s characteristics and lactation strategy, or discussion of a paper appointed by the instructor (rubrics will be provided).

**Debates:** individual presentation (10 min.) on a debate topic selected by the instructor.

**Homework format:** weekly (canvas), questions will be formulated from lectures and reading materials.

**Grading scale**

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**Important dates!**

- August 22 - First day of class
- **September 26 - First mid-term**
- October 22 and 24 – Mammals presentations
- **October 31 – Second mid-term**
- November 26 and 28 – Graduate student’s presentations
- **December 5 - Third mid-term**

Information regarding University Policy on grade point equivalencies and calculation of grade points is located at the following web address:

https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

**Please note:** This course is taught concomitant with the graduate version **ANS 4701**. The undergraduate students will be required to perform all of the graded tasks listed above (including mid-terms, homework and a group presentation) but they will not be required to write the essay or present the debate topics.

**Attendance and make-up work.** Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx. It is highly recommended that you do not miss class as your final grade will be positively correlated with attendance. A student missing an exam will be allowed to make up the exam if a documented, valid reason as outlined in UF’s policy for excused absences exists. This should be discussed with the instructor in advance (when possible), preferably by email. A missed exam for an unexcused absence will be considered as a “0”.


University of Florida Complaints Policy

Services for students with disabilities
The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.
0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Academic honesty
As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment."
It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code.

Software use
All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Campus helping resources
Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university’s counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.
- University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/
  Counseling Services
  Groups and Workshops
  Outreach and Consultation
  Self-Help Library
  Wellness Coaching
- U Matter We Care, www.umatter.ufl.edu/
- Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/