Dairy Science 305
Lactation Physiology
Fall 2014 Syllabus

Instructor: **Laura Hernandez, Ph.D.**
Office: 864 Animal Science
Phone: 263-9867
Email: llhernandez@wisc.edu
Office Hours: By appointment

Lecture: 11:00-11:50 am, Tuesday and Thursday
Animal Science 209

Lab: 10:00 am-11:55 am or 12:05-2:00 pm, Wednesdays
Animal Science 203
Graduate Teaching Assistant: Jimena Laporta, jlaporta@wisc.edu
Graduate Teaching Assistant: Di Liang, dliang7@wisc.edu

References:

Textbook: Lactation and the Mammary Gland. R. Michael Akers. 2002. Iowa State Press. (**Not required**)
Lactation Biology Website: University of Illinois (primary source of additional reading)
http://classes.ansci.illinois.edu/ansc438/index.html
Lactation on the NIH website (primary source of additional reading)
http://mammary.nih.gov/
http://mammary.nih.gov/reviews/lactation/Neville001/index.html
Review Papers: Will be provided in class or posted on Learn at UW
Lecture Power Points

Course Objectives:

- To gain an understanding of the origin of the mammary gland
- To understand mammary gland anatomy and physiology
- To understand how the mammary gland develops in mammalian species (in utero all the way through the lactation cycle)
- To understand the mechanisms governing mammalian milk synthesis and secretion
- To understand the role the mammalian endocrine system plays in governing lactation and mammary gland development
- To gain an understanding of mammalian mammary gland control at the local level (autocrine/paracrine mechanisms)
- The components that comprise mammalian milk and their functions for the neonate
- Diseases that affect the mammalian mammary gland (i.e., mastitis, breast cancer, etc.)

Grading:

Exams: 3 exams-100 points each
Final Exam: Comprehensive-150 points
Paper: 100 points
Lab: Lab write-ups, 10 points each (130 points total)
Lab quizzes: 5 quizzes-10 points each

Total Points: 73- points

You will pick a topic on a physiological process that occurs during lactation (i.e., galactopoiesis, mammogenesis, milk carbohydrate synthesis, mammary gland involution, etc.) in any mammalian species **OTHER than dairy cattle**. Paper must contain at least 5 references that are from refereed journals and is **due November 25. Topics are due to me by October 10th. Make sure to read guidelines/rubric for paper.**

Lab:

You will do lab write-ups for each laboratory that will be due the following laboratory. Each write-up will be worth 10 points for a total of **130 points**. Lab write-ups will need to include the following: objective of laboratory, procedures followed in detail. Five lab quizzes will be given, each worth **10 points** at the beginning of select labs for a total of **50 points**. No notice will be given for quizzes.

COURSE SCHEDULE:

September 2:	Course Introduction
September 3:	**LAB:** Introduction to lab
September 4:	Evolution of the mammary gland and lactation
September 9:	Mammary gland macrostructure and nervous system
September 10:	**LAB:** Udder Dissection- Macrostructure/Microstructure of Mammary Gland, Nervous, Circulatory, Lymphatic Systems
September 11:	Mammary Circulation and Lymphatic Systems
September 16:	Mammary gland secretory cell and organelles (microstructure)
September 17:	**LAB:** Mammary gland biopsies/blood collection
September 18:	Introduction to endocrinology

September 23:	Endocrine regulators of mammogenesis
September 24:	**LAB:** Mouse Milking Laboratory/Mouse Mammary Gland Dissection
September 25:	**Exam #1**
September 30:	Mammogenesis-fetal development through puberty
October 1:	**LAB:** Analysis of milk from different species for lactose (Lactose assays)
October 2:	Mammogenesis-Post-puberty through weaning (involution)
October 7:	Lactogenesis (Stage I and II)
October 8:	**LAB:** Interpretation of Lactose data
October 9:	Galactopoiesis (Copious milk secretion)
October 14:	Neuroendocrine control of lactation and milk ejection
October 15:	**LAB:** Blood, urine, milk collection from fresh cowsnBHBA assay on blood samples (cow side test vs. ELISA; Ketone analysis on urine and milk using Ketostix strip tests)
October 16:	Involution (Weaning/Dry-off) and Environmental Factors Effecting Milk Yield
October 21:	**Exam #2**
October 22:	**LAB:** Evaluation of Tissue Histology on mammary gland biopsy samples from cows and mammary glands from mice (Dr. Ruth Sullivan, Veterinary Pathologist)
October 23:	Milk properties and composition
October 28:	Milk carbohydrate synthesis and secretion
October 29:	**LAB:** RNA extraction of mammary gland samples
October 30:	Milk lipid synthesis and secretion
November 4:	Milk protein synthesis and secretion
November 5:	**LAB:** cDNA synthesis of RNA extractions

November 6:	Other important milk components
November 11:	Manipulation of milk production
November 12:	**LAB:** PCR for alpha-lactalbumin on mammary gland samples
November 13:	Basics of Immunology
November 18:	Mastitis- Dr. Pam Ruegg, Milk Quality Specialist
November 19:	**LAB:** Milk sample collection at the Dairy Cattle Center, proper sterile milk sampling techniques, CMT test, microbiological plating
November 20:	Mastitis- Dr. Pam Ruegg, Milk Quality Specialist
November 25:	**Exam #3; Paper Due**
November 26:	**LAB: NO LAB**
November 27:	**Thanksgiving Holiday**
December 2:	Comparative Lactation
December 3:	**LAB:** Antibiotic residue testing using the SNAP Beta-Lactam Test Kit
December 4:	Comparative lactation/Breast Cancer
December 9:	Breast cancer
December 10:	**LAB:** Analysis of mastitis cases at DCC using dairy comp 305
December 11:	Review for Final; Final exam will be 100 points of questions taken from the previous 3 exams and 50 points will be based on the new material lectured on after the Thanksgiving break. **Final Exam is December 14, 2014 from 2:45 pm - 4:45 pm**

PAPER GUIDELINES FOR DAIRY SCIENCE 305

You will be composing a 5-page paper for this class, single-spaced, with font no larger than 12 point with margins set a 1”-**10 points**. It will be worth 100 points.

PAPER EXPECTATIONS

1) You will pick a topic on a physiological process that occurs during lactation (i.e., galactopoiesis, mammoogenesis, milk carbohydrate synthesis, mammary gland involution, etc.) in any mammalian species OTHER than dairy cattle-**10 points**
2) You will follow the following format for your paper, and your references need to follow the style of the Journal of Dairy Science)
    a. Abstract (300 words or less)-**10 points**
    b. Introduction (introduce your topic, present any questions and objectives surrounding the topic, importance to lactation physiology)-**10 points**
    c. Discussion of topic in detail (body of paper)- **10 points**
    d. Summary (summarize all the findings of your paper)- **10 points**
3) You must use references from peer-reviewed scientific journals (use pubmed or google scholar to find references) to write your paper-**10 points**
4) Paper must contain AT LEAST 5 references-**10 points**
5) Follow the references style for citation and assembly used in the Journal of Dairy Science-**10 points**
6) Include one table or figure at the end of your paper (DOES NOT COUNT TOWARDS THE 5 PAGES) that summarizes your topic-**10 points**

LAB WRITE UP GUIDELINES

You will write a lab report for each of the labs (13 total) and they are due the following week at the beginning of the laboratory class and need to be a minimum of 1 page single-spaced. Occasionally lab write-ups can be conducted on the handouts given for the lab, where you will have to fill in information and answer specific questions. This will be addressed on a lab-to-lab basis by your TA. The last lab write up can be turned in at the final exam. The layout will be as follows:

Laboratory Objective: Why are we performing the laboratory? What is the purpose? (2 points)

Procedures Followed: What are the EXACT detailed procedures that were performed and the materials that were required (2 points)

Results of Experiments: What happened in the laboratory (you can include pictures, figures in this portion if the experiment requires it) (3 points)

Interpretation of data: What do your results mean? (3 points)