

# **DOMESTIC ANIMAL METABOLISM**

**ANIMAL SCIENCE 2010, Spring Semester, 2014**  
**MWF 9:00-9:50**

*Prerequisite: Chem. 1000*

**INSTRUCTOR: Dr. Dan Rule**

**OFFICE: Room 119, Animal Science/ Molecular Biology Complex**

**LAB: Room 116, Animal Science (across from office)**

**OFFICE HOURS: 2:00 to 3:30, Monday, Wednesday, and Friday, or by appointment**  
**Check the lab if not in the office.**

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## **COURSE GOAL:**

The goal of Domestic Animal Metabolism is to introduce students to the principles of cellular and whole body metabolism in food producing animals (ruminants, non-ruminants, growth and lactation). The fundamental concepts of cellular metabolism and how it is related to the various types of macromolecules will be covered. Moreover, the goal of Domestic Animal Metabolism is to relate the chemical nature of cellular compounds to storage and generation of energy, production of structural tissues, and dietary nutrients with cellular metabolism. The course will also introduce students to the nomenclature and metabolic function of vitamins, as well as to the concept of endocrine regulation of metabolism through the use of food producing animals as the example and model.

## **COURSE MATERIALS:**

The primary text will be the **Study Guide to Domestic Animal Metabolism**. Additional material will be provided to the class when appropriate. Reference material in the following books can serve to provide greater depth if desired by the individual student:

Nutritional Biochemistry (T. Brody)

Nutritional Biochemistry and Metabolism (M. C. Linder)

Clinical Biochemistry of Domestic Animals (J. J. Kaneko)

Biochemistry (M. K. Campbell)

Principles of Biochemistry (A. L. Lehninger et al.)

Organic Chemistry (K. P. C. Vollhardt and N. E. Schore)

## **COURSE AND EXAM FORMAT:**

The course will be primarily lecture with discussion as part of each session. Quizzes will be given each Wednesday beginning January 23. **The highest 10 quiz scores will be counted toward course credit. NOTE: Makeup quizzes and exams will be granted for University excused absences only. Three 100-point exams and a 200-point semi-comprehensive final exam will be used for total course credit determination. The only “extra credit” offered will be for participation in the Academic Quadrathlon held in March.**

**Grading will be on a 10 percentage point spread from 100% to 50%.**

## **EXPECTATIONS:**

Students will be expected to attend every class. Lectures and discussions are designed to provide students with the opportunity to acquire an understanding of the complex nature of metabolism. Student’s best opportunity to interact with the course instructor will be during class time; it is the goal of the instructor to see to it that a thorough understanding of the material is attained. Students are expected to seek advice of the course instructor when they are having difficulties. Students can expect the instructor to be available to them during office hours or at other times during the week if an appointment is made.

## **CELL PHONES/TEXTING DURING CLASS:**

**Cell phones have been used to commit academic dishonesty. No cell phones will be on during class. Anyone using a cell phone during a quiz or a midterm will be excused from the classroom immediately and face consequences consistent with academic dishonesty. Fundamentally, cell phone use during class is rude and distracting and won’t be tolerated. Be considerate of your class mates and your instructor and turn off your cell phone before class begins.**

## COURSE OUTLINE:

No. of lectures	Topic
1	<ul style="list-style-type: none"><li>- <b>Overview of Metabolism in Domestic Animals</b></li><li>- Gross comparison of avian, ruminant, and non-ruminant species.</li><li>- <b>The nature of metabolism relies on chemical reactions in living cells. The type of chemical bond influences how reactions occur.</b></li></ul>
2	<ul style="list-style-type: none"><li>- Description and comparison of hydrogen bonds, ionic bonds, covalent bonds, and resonant structures.</li></ul>
1	<ul style="list-style-type: none"><li>- Water, the solvent of biological systems.</li></ul>
1	<ul style="list-style-type: none"><li>- What is pH and how do acids and bases influence reactions and metabolism in animal cells?</li><li>- <b>Structural characteristics of biological molecules influence the role of macromolecules in metabolism.</b></li></ul>
4	<ul style="list-style-type: none"><li>- The nomenclature and nature of functional groups in biomolecules.</li></ul>
3	<ul style="list-style-type: none"><li>- The involvement of functional groups in cellular metabolism.</li><li>- <b>Structure and Function of Metabolic Macromolecules.</b></li><li>- <b>Proteins and Amino Acids.</b></li></ul>
2	<ul style="list-style-type: none"><li>- Amino acid structure and nomenclature.</li></ul>
2	<ul style="list-style-type: none"><li>- Protein structure.</li><li>- <b>Proteins contribute to tissue structure, tissue function, and catalysis in animal metabolism.</b></li></ul>
1	<ul style="list-style-type: none"><li>- Nature of connective tissue and muscle.</li></ul>
2	<ul style="list-style-type: none"><li>- Enzymes and cofactors.</li></ul>
1	<ul style="list-style-type: none"><li>- Peptide hormones.</li></ul>
1	<ul style="list-style-type: none"><li>- Introduction to protein biosynthesis.</li><li>- <b>Carbohydrates.</b></li></ul>
1	<ul style="list-style-type: none"><li>- Hexoses and pentoses.</li></ul>
1	<ul style="list-style-type: none"><li>- Starch, cellulose, and glycogen.</li></ul>
8	<ul style="list-style-type: none"><li>- Contribution of carbohydrates to energy metabolism in ruminants and non-ruminants.</li><li>- <b>Lipids provide structure, fuel, and precursors for animal metabolism.</b></li></ul>
1	<ul style="list-style-type: none"><li>- Structure, nomenclature, and occurrence of lipids.</li></ul>
1	<ul style="list-style-type: none"><li>- Production of fatty acids in domestic animals – species diversity in location and generation of precursors.</li></ul>
1	<ul style="list-style-type: none"><li>- Contribution of lipids to energy metabolism and metabolic regulation.</li><li>- <b>Vitamins are “vital” to metabolism.</b></li></ul>
1	<ul style="list-style-type: none"><li>- Introduction to structure and function of vitamins.</li></ul>
1	<ul style="list-style-type: none"><li>- <b>Integration of Metabolism.</b></li></ul>
3	Midterm exams.