

**ANIMAL SCIENCE 5770/ FOOD SCIENCE 5770
LIPID METABOLISM – FALL, EVEN NUMBERED YEARS**

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Course Goal:

The goal of the course is to provide an in depth study of cellular and molecular regulation of digestion, absorption, transport, and cellular metabolism of lipids in humans and domestic animals, as well as implications and involvement with disease. Lipid metabolism is not just about “fat.” It should be called something like “metabolomics of lipids” because of the interaction of many types of bio-molecules: lipids, proteins, carbohydrates, and nucleic acids (molecular biology). For example, to understand regulation of triacylglycerol hydrolysis, a thorough understanding of protein chemistry and enzyme kinetics is essential. During the course, the application of the other important disciplines will be discussed and explained to provide students with the necessary background to understand regulation of lipid biochemistry.

Expectations:

1. Students are expected to attend class, and to enter into discussions when initiated, or called upon.
2. Students are expected to be prepared for class by reading any hand out materials or following up on reading assignments for which they are responsible for obtaining the material, and to do so when given prior to appointed discussion days.

Class material:

Material will generally be provided to students, either in hand out form, as reading assignments for which the student is responsible for obtaining (quite a bit is available on the web), or as outlined during the class period during lectures and discussions.

Material will be drawn upon from the following sources:

1. Biochemistry of Lipids and Membranes, Vance and Vance.
2. Lipid Biochemistry, Gurr and Harwood.
3. The Regulation of Membrane Lipid Metabolism, Thompson.

4. **Lipids: Chemistry, Biochemistry, and Nutrition, Mead et al.**
5. **Lipid Metabolism in Ruminant Animals, Christie.**
6. **Lingual and Gastric Lipases, Hamosh**
7. **Biology of Cholesterol, Yeagle.**
8. **Lipoprotein Lipase, Borensztajn.**
9. **Lipids in Human Nutrition, Spiller.**
10. **Recent reviews and research articles collected from the scientific literature – mostly from Annual Reviews of Nutrition; Annual Reviews of Biochemistry (if accessed via the UW library system, articles published in Annual Reviews can be down loaded directly).**

Format:

Primarily lecture, but students are expected to enter into discussion.

Exams:

1. **Two midterm exams and a final (not comprehensive) will be given.**
2. **Format will be essay only, and topics will be chosen to challenge students to integrate knowledge and ideas developed during the course.**

Writing project: A short (10 page) term paper will be assigned. The topic will be left up to the student; however, a topic related to the student's thesis research will be encouraged because this will allow the student to either begin or continue their thesis writing as it may relate to lipid metabolism. Details will be discussed at the beginning of class and at midterm. For grading purposes, the paper will be equal to one of the midterms in point value (it doesn't replace anything).

Course Topics:

1. **Introduction and overview.**
2. **Brief review of lipid structure and nomenclature.**
3. **Lingual and gastric lipolysis.**
4. **Ruminal metabolism of triacylglycerols and phospholipids; conjugated linoleic acid.**
5. **Lipid metabolism in cells of the small intestine.**
6. **Dietary fatty acids: human relevance.**
7. **Lipoprotein lipase.**
8. **Obesity.**
9. **Intra- and extracellular transport of fatty acids.**
10. **Regulation of fatty acid biosynthesis/elongation and desaturation.**
11. **Polyunsaturated fatty acids.**

- 12. Regulation of glycerolipid biosynthesis.**
- 13. Mobilization and oxidation of stored fatty acids.**
- 14. Methodologies used in the study of chemistry and metabolism of lipids.**