

ANSC 618
LIPIDS & LIPID METABOLISM
MW 3:00 4:15
WCBA 105

INSTRUCTOR: Stephen B. Smith

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Course website: <http://animalscience.tamu.edu/academics/texas-am-anscnutr-618/>

CLASSROOM: WCBA 105

Office hours: Drop in or by appointment

OBJECTIVES:

Upon completion of this course, the student should be able to effectively:

1. Describe the chemical nature of the various classes of lipids and lipid-derived hormones;
2. Discuss the absorption and metabolism (synthesis/degradation/modification) of fatty acids and lipids in monogastric and ruminant species;
3. Discuss the relationship between lipid metabolism and obesity;
4. Describe the relationship between lipid metabolism and cholesterol homeostasis
5. Understand lipids as hormones

Scope of the course. This is a comparative biology/biochemistry course. It will not focus solely on human lipid metabolism, nor will it focus only on rodent models or livestock species. The goal of the course is to provide the student with an understanding of the role of lipid metabolism in normal and dysfunctional growth and metabolism.

PREREQUISITE: BICH 410 or approval of instructor.

Lecture material. Lecture material for each section will be posted throughout the semester at: <http://animalscience.tamu.edu/academics/texas-am-anscnutr-618/>.

The lecture “handouts” will be posted at least one week in advance of their respective lecture day. **You will be expected to download the lecture for its respective day of presentation and review the material before coming to class.**

RECOMMENDED READING MATERIAL:

Lipid Biochemistry, 5th ed. Gurr, Harwood, and Frayn, Blackwell Science. This text provides excellent background for general lipid chemistry and lipid metabolism.

This text can be purchased from amazon.com new for about \$60. You are not required to purchase the text, but it is highly recommended if you plan to do research in lipids.

ATTENDANCE: Students will be allowed University-sanctioned absences.

EXAMS:	Midterm I*	50 points
	Midterm II	50 points
	Midterm III	50 points
	Midterm IV	50 points
	Quizzes**	40 points
	Final (40% new, 60% review)	<u>100</u> points
TOTAL		340 points
TOTAL FOR GRADE BASIS***		290 points

GRADING: A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = 59% or lower

*There will be four midterms, each covering the material from five lectures. The final exam will cover lecture material from three classes plus material from the previous midterms.

Twenty, two-point quizzes will be given throughout the semester. The quizzes are designed to encourage students to study ahead for class and reinforce exam material. **There are no make-up quizzes, but students will not be penalized for missing quizzes due to excused absences (total quiz score will be adjusted accordingly). Excused absences include illnesses, scientific meetings in which the student is required to attend, and unavoidable laboratory research.

***Students are allowed to drop one midterm (Midterms I – IV). **Students are required to take all midterms and the final, but students are allowed to miss one midterm for excused absences.** Students who do not miss any midterms may drop the midterm with the lowest score. **Students who miss two midterms (excused or otherwise) are required to take a midterm that includes information from both missed midterms.**

AGGIE CODE OF HONOR: An Aggie does not lie, cheat, or steal, and will not tolerate those who do.

LECTURE OUTLINE	BACKGROUND READING
SECTION I. Lipid Structures January 21 Course introduction 26 Chemistry of fatty acids 28 Fatty acid nomenclature February 2 Melting points of animal fats 4 Triacylglycerol composition 9 Midterm I (Lipid Structures)	Lipid Biochemistry, 5 th ed. Gurr, Harwood, and Frayn. Sections 2.1, Handout 1 Section 2.1, Handout 2 Handout 3 Section 2.2, Handout 4
SECTION II. Lipid Metabolism 11 Fatty acid synthesis, elongation, desaturation, and hydrogenation 16 Triacylglycerol synthesis	Section 2.2, Handouts 5 & 6 Section 3.1, 3.4, Handouts 6 & 7

18	Lipolysis	Section 3.5, Handout 7
23	β -oxidation and ketone bodies	Section 2.3, Handout 8
25	Regulation of fatty acid metabolism	Sections 3.6 & 5.3, Handout 8
March		
2	Midterm II (Lipid Metabolism)	
SECTION III. Lipid Transport		
4	Absorption of lipids from the small intestine	Section 5.1, Handout 9
9	Absorption of fat-soluble vitamins	Section 5.1, Handout 10
11	Lipoprotein metabolism	Section 5.2, Handout 11
16-18	Spring Break	
23	Lipoprotein metabolism	Section 5.2, Handout 11
25	The LDL receptor; familial hypercholesterolemia	Section 5.2, Handout 12
31	Midterm III (Lipid Transport and Lipoprotein Metabolism)	
April		
SECTION IV. Cholesterol Metabolism		
1	Cholesterol synthesis	Section 7.5, Handout 13
6	Dietary fat and heart disease; intervention trials and epidemiological data	Section 5.4, Handout 14
8	Adipose tissue differentiation	Section 2.4, Handout 15
13	Fatty acid metabolism, stearoyl-CoA desaturase, and obesity	Section 5.4, Handout 16
SECTION IV. Structural Lipids/Obesity		
15	Midterm IV (Cholesterol Metabolism and Obesity)	
20	Lipid peroxidation	Remainder of Handout 8
22	Prostaglandins, leukotrienes, and phosphatidyl inositols	Section 6.5, Handout 17
27	Membrane lipids	Section 6.3, Handout 18
29	Sphingolipids and membrane structure	Section 5.4, Handout 18
May		
4	Inflammation and obesity	Handout 19
6	Reading Day	
11	FINAL EXAMINATION (10:30 a.m. – 12:30 p.m.)	
13	Final grades for degree candidates	
14	Commencement	
18	Final grades due to the registrar	