

Biol 439-01 (Call # 15034)
 Biol Sci 247
 MW 4:20-6:00 pm

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Office hours: TWR: 2:00-4:00 pm

BIOL 439: Endocrinology

This course provides an introduction to the endocrine system. Because endocrinology is borne out of an inter-relationship among several biological disciplines, such as biochemistry, cell biology, and physiology, students wishing to succeed in this course should have fulfilled the pre-requisites of BIOL 380 (Cell Biology) or the entire CHEM 431 (Biochemistry) series.

COURSE OBJECTIVES: The objectives of this course are to gain detailed knowledge of (a) the structure and function of the endocrine system; (b) homeostasis and feedback mechanisms; and (c) factors regulating hormone production, secretion, and action. In addition, students will successfully research and write a review paper germane to endocrinology.

COURSE TEXTBOOK: Griffen, J.E., and Ojeda, S.R. *Textbook of Endocrine Physiology*. 5th ed., Oxford University Press, 2004.

GRADING: There will be 2 midterm exams each consisting of a mixture of multiple choice and short answer/short essay questions, worth 100 points each. There will also be 5 quizzes (20 points each), a term paper (worth 120 points), attendance (2 points /day = 32 points), and a final exam (120 points, March 15, 4:30-7:00 pm). Total points, therefore, will equal 572 (an approximate number, as each exam will be +/- 5-10 points). Grades will be assigned based on the following scale:

“A” = 90-100% of possible points

“B” = 80-89%

“C” = 65-79%

“D” = 50-64%

“F” < 50% of possible points

Within each grade range, the top 3% and the bottom 3% will receive “+” and “-“ grades.

Exams and Quizzes. I use the quizzes to encourage you to attend class; towards that end, there will be no make-up quizzes. If you miss an exam, I will consider a make-up, provided you can furnish me with a valid reason for missing it.

Term Paper. The term paper should be 10-12 typed, double-spaced pages, reviewing the *most current literature* on an endocrine-related topic. You may use books, but not as primary sources, and only to clarify concepts in your mind. Papers are due Week 10, the

week of March 8. Late papers will be penalized 2 points per day it is late. However, papers received during Week 9 will receive 15 extra credit points. Possible topics might be, but are not limited to:

- The roles of leptin and ghrelin in satiety
- The molecular basis of insulin-stimulated glucose uptake
- The effects of (intense) regular exercise on the maintenance of diabetes
- The role of estrogen in calcium homeostasis
- The molecular reasons of estrogen (hormone) replacement therapy
- Anabolic effects of growth hormone
- Regulation of growth hormone
- Steroid hormone pharmacology (*e.g.*, for inflammation)
- Melatonin and circadian rhythms
- Iodine regulation in the thyroid
- Insulin-like growth factor (be more specific)
- The roles of glucagon and insulin in blood glucose balance
- The effects of anabolic steroids on testosterone production

Biol Sci 439 Lecture Schedule

Lectures can be found on my faculty web-page at:
<http://www.calstatela.edu/faculty/mchen/>

Date	Topic (Lecture #)	Reading Assignment
Jan. 4	Introduction to the course – Endocrine System (1)	Chapter 1
Jan. 6	Hormone Chemistry; Types of Hormones and Chemical Messengers (2)	Ch. 1, pp 4-5
Jan. 11	Molecular Basis of Protein Hormone Production (3)	Ch. 2 (pp. 17-25)
Jan. 13	Synthesis of Steroid Hormones (4)	Ch. 9 (pp 187-190; 228; 321-323)
Jan. 18	Martin Luther King, Jr. Day – Holiday	
Jan. 20	Regulation of Plasma Hormone Levels (5)	Pp 10-12; 189-191
Jan. 25	Hormone Receptors on the Plasma Membrane (6)	Ch 3 (pp 49-71)
Jan. 27	Intracellular Hormone Receptors (7)	Ch 3 (pp 72-82; p. 47)
Feb. 1	Midterm Exam 1 (100 pts, Covers Lectures 1-7)	
Feb. 3	Gastrointestinal Hormones (8)	See Lecture Slides
Feb. 8	The Hypothalamus and Pituitary (9)	Ch 6 (pp 120-136; Ch 7 (pp 147-161)
Feb. 10	The Thyroid Hormones (10)	Ch 13 (pp 294-308)
Feb. 15	Hormonal Control of Ca Homeostasis (11)	Ch 15
Feb. 17	Growth Hormones (12)	Ch 6 (pp 137-141); Ch 13 (pp 274-284)
Feb. 22	Midterm Exam 2 (100 pts, Covers Lectures 8-12)	
Feb. 24	Pancreatic Hormones: Metabolism of Nutrients (13)	Ch 16

Mar. 1	Adrenal Gland (14)	Ch 14
Mar. 3	Development and Anatomy of Reproductive Endocrine System (15)	Ch 8 (pp 167-173)
Mar. 8	Reproductive Endocrinology in the Male (16) Term Paper Review Due.	Ch 10
Mar. 10	Reproductive Endocrinology in the Female (17)	Ch 9; Ch 11 (pp 249-260)
Mar. 15	Final Exam (120 pts; Covers Lectures 13-17); 4:30-7:00 pm	

ADA: Reasonable accommodation will be provided to any student who is registered with the Office of Students with Disabilities and requests needed accommodation.

Student Learning Outcomes and Learning Objectives.

Students will be able to demonstrate knowledge on the following:

- 1) Introduction
 - a. Homeostasis (both negative and positive)
 - b. Functions of the endocrine system
 - c. Components of the endocrine system
 - d. Chemical structure of hormones
 - e. Regulation of hormone secretion
 - f. Transport and distribution of hormones
 - g. Mechanisms of hormone action
 - h. Regulation of hormone receptors
- 2) Hormone Chemistry
 - a. Classification of hormones
 - b. Classification of system/function
 - c. Classification by source
 - d. Classification by structure
 - e. Peptide hormones
 - f. Steroid hormones
 - g. Amino acid derivatives
- 3) Molecular Basis of Peptide Hormone Production
 - a. Regulation of peptide hormone levels
 - b. Transcription and translation
 - c. Secretion
- 4) Synthesis of Steroid Hormones
 - a. Overview of steroid hormones
 - b. Peptide vs steroid hormones
 - c. Cholesterol
 - d. Steroids from the adrenals
 - e. Steroids from the testes
 - f. Steroids from the ovaries
- 5) Regulating Plasma Hormone Levels
 - a. Factors Involved: Secretion versus Removal

- b. Regulation of secretion
 - c. Metabolic clearance and half-life
 - d. Carrier proteins
 - e. Glycosylation role in hormone-receptor binding
- 6) Hormone Receptors on the plasma membrane
- a. Membrane-bound receptors
 - b. G-protein coupled receptors
 - c. Signal transduction via camp
 - d. Role of Ca
 - e. Role of protein kinase C
- 7) Intracellular Hormone Receptors
- a. Steroid receptors
 - b. Responsive elements
 - c. Transcription
 - d. Steroid receptor pathways
 - e. Regulation of steroid hormones
- 8) Gastrointestinal Hormones
- a. Digestion and absorption
 - b. Pancreatic hormones
 - c. GI hormones and paracrine function
 - d. Integration of neural and endocrine signals
 - e. Signaling mechanisms
- 9) Hypothalamus and Pituitary
- a. Regulation of anterior and posterior pituitary hormones
 - b. Hormones and releasing factors
 - c. Water balance via hormone regulation
- 10) Thyroid Hormones – Production and Regulation
- a. Production of thyroid hormones
 - b. Transport and activities of T3 and T4
 - c. Regulation and secretion
 - d. Actions of thyroid hormones
- 11) Regulation of Calcium Homeostasis
- a. How Ca is regulated by parathyroid hormone, calcitonin, and vitamin D
 - b. Bone strength and Ca metabolism
- 12) Growth Hormone
- a. Regulation, synthesis, release, actions, and metabolism of growth hormone
 - b. GH receptor
- 13) Pancreatic Hormones and Carbohydrate Metabolism
- a. Pancreas as an exocrine organ
 - b. Insulin and glucagon regulation of CHO metabolism
 - c. Major metabolic pathways for CHO, lipids, and proteins
- 14) Adrenal Steroid Hormones
- a. Adrenal steroidogenesis
 - b. Cortisol

- c. Aldosterone
 - d. Androgens
- 15) Development and anatomy of the Reproductive System
- a. Hormone regulation of sexual differentiation
 - b. Hormones in puberty
 - c. Sex differentiation and the brain
- 16) Reproductive Endocrinology in the Male
- a. Neuroendocrine control of the testes
 - b. Mechanism of LH and FSH
 - c. Transport, metabolism, and actions of testosterone
 - d. Meiosis and spermatogenesis
 - e. Seminal fluid formation
 - f. Male sexual function
- 17) Reproductive endocrinology in the female
- a. Neuroendocrine regulation of ovarian hormones
 - b. Follicle development, ovulation, and luteinization
 - c. Oogenesis and oocyte maturation
 - d. Menstrual cycle
 - e. Pregnancy, parturition, and lactation

ACADEMIC HONESTY: Students are expected to read and abide by the University's Academic Honesty Policy, which can be found at <http://www.calstatela.edu/academic/senate/handbook/ch5a.htm>. Students who violate this policy will be subject to disciplinary action and may receive a failing grade in the course for a single violation.

FURLOUGHS:

CSU Employee Furloughs – Impact on Classes

This year across this campus and around the CSU system some class days will be cancelled because of furloughs. A furlough is mandatory un-paid time off; faculty and staff on each CSU campus are being “furloughed” two days per month.

For this course (Biol Sci 439), there are no furloughs per se as this class meets only on Mondays and Wednesdays and Furloughs occur on Fridays. Therefore, I will technically not be answering any e-mails nor any other questions on the following Fridays this quarter: **Specifically, Jan 15, Jan 29, Feb 12, Feb 19, Mar 5, and Mar 12.** It is important to recognize that these days off are **not** holidays. Instead, they are concrete examples of how massive state budget cuts have consequences for you as students and for me as a faculty member.

The CSU has suffered chronic under funding for at least 10 years. This year the budget cuts are the worst in the history of our university system — \$584 million or 20% of our budget.

The CSU administration is attempting to deal with these cuts with huge increases in student fees (32%), course reductions, and lay-offs of faculty and other university employees.

In addition to paying higher fees, students will likely be affected by reduced services and classes. The library will have shorter hours. Many campus support services may be decreased or eliminated. There may be challenges in getting needed signature on forms. Many courses will be cut from the class schedule or will be full.

If you would like to take action, or simply learn more, I strongly recommend you contact the California Faculty Association on campus to get connected with other CSULA students who are working on these issues.

For more information, please contact CFA by email: cfa@cslanet.calstatela.edu or by phone: 323 343 – 5310.