GENERAL ENDOCRINOLOGY (fall 2016)

This course (4 credits, 11:067:450:01) meets M4 (2:15–3:35 PM) and W3-4 (12:35-3:35 PM, 2 periods) in Bartlett 123, Cook Campus

Instructor: JP Advis DVM, PhD; Office hours: MT 11AM - 2PM; F 11AM – 12PM, Bartlett r102, Cook, or by appointment (voice: 932-9240; email: advis@aesop.rutgers.edu)

Course web site: http://rci.rutgers.edu/~advis/

Learning goals:
The goal of this course is to provide students with an understanding of how the endocrine system is involved in a mammalian organism's physiological functions. Specifically, students will learn: 1) an overview of the endocrine system as a communication system (e.g., extracellular signal, receptor, intracellular links, mechanisms of hormonal action, physiological effect); 2) an overview of how information was obtained through endocrine research (e.g., experimental and clinical approaches, ablation and replacement therapies, DNA / RNA - related molecular approaches, signal transduction pathways); and 3) an overview related to basic endocrine communication and issues available to the general population (e.g. endocrine pathologies, anabolic steroids, GH use and abuse, stress, control of appetite, obesity, biological clocks).

MEETING & DATE / LECTURE & TOPIC COURSES /CHAPTERS IN COURSE TEXTBOOK
01 Sept Wed 07 Lecture: Introduction and overview of this endocrinology course 1, 2
02 Wed 07 Recitation: Introduction and examples of the recitation section and its rules 1, 2
03 Mon 12 Lecture: Action of Steroids and Thyroid Hormones (liposoluble ligands) 1, 2
04 Wed 14 Lecture: Action of Peptide, Protein, Neurohormones (watersoluble ligands) 1, 2
05 Wed 14 Recitation: Hormone action of lipo - soluble ligands (Q1 due, see rules) 1, 2
06 Mon 19 Lecture: Hypothalamus and Hypophysiotropic Neurohormones 1, 2
07 Wed 21 Lecture: Endocrinology of Anterior Pituitary and Its Hierarchies 1, 2
08 Wed 21 Recitation: Hormone action of water - soluble ligands (Q2 due, see rules) 1, 2
09 Mon 26 Lecture: Endocrinology of Pituitary (AntP+PostP) and Pineal Glands 1, 2
10 Wed 28 Lecture: Endocrinology of Ca Regulating Hormones and Homeostasis 1, 2, 10
11 Wed 28 Recitation: The Hypothalamic Anterior Pituitary Unit (Q3 due, see rules) 1, 2
12 Mon 03 Lecture: Endocrinology of Thyroid Gland and Thermogenesis 1 - 3, 10
13 Wed 05 Recitation: Endocrinology of Ca and Thyroid control (Q4 due, see rules) 1 - 3, 10
14 Wed 05 Lecture: Endocrinology of Adrenal Medulla, Catecholamines and Stress 1 - 4, 10
15 Mon 10 REVIEW - Material from meeting #1 through meeting #13 1 - 4, 10
16, 17 Wed 12 EXAM #1 - 25% of final grade (meetings #1 through #13) 1 - 4, 10
18 Mon 17 Lecture: Endocrinology of GI System and its Hormone Families 4 - 6
19 Wed 19 Lecture: Endocrinology of the Pancreas and Diabetes Mellitus 4 - 7
20 Wed 19 Recitation: The ANS and the GI hormones (Q5 due, see rules) 4 - 6
21 Mon 24 Lecture: Endocrinology of Glucocorticoids and Control of Metabolism 4 - 8
22 Wed 26 Lecture: Endocrinology of Growth, its Hormones and its Growth Factors 4 - 8, 11
23 Wed 26 Recitation: Hormonal control of Intermediary Metabolism (Q6 due, see rules) 4 - 8
24 Mon 31 Lecture: Endocrinology of Mineralocorticoids, RAS and Blood Pressure 4 - 11
25 Wed 02 Recitation: Hormonal control of Growth / Blood Pressure (Q7 due, see rules) 1 - 11
26 Wed 02 Lecture: Overview on Hormonal Integration and Homeostatic Control 1 - 11
27 Mon 07 REVIEW - Material from meeting #14 and #18 through meeting #25 1 - 11
28, 29 Wed 09 EXAM #2 - 25% of final grade (meetings #1 through #25) 1 - 11
30 Mon 14 Lecture: Integration: Endocrinology of Sex Development / Reproduction 1 - 14
31 Wed 16 Lecture: Integration: Endocrinology of Menstrual Cyclicity / Contraception 1 - 14
32 Wed 16 Recitation: Integration: Puberty Onset and its failures (Q8 due, see rules) 1 - 14
33 Mon 21 Lecture: Integration: Endocrinology of Ingestive Behaviors / Food Intake 1 - 14
34 Mon 28 Lecture: Integration: Endocrinology of Immune Interactions / Homeostasis 1 - 14
35 Wed 30 Lecture: Integration: Endocrinology of Biological Rhythms / Feedforward 1 - 14
36 Wed 30 Recitation: Integration: Food Intake and Reproduction (Q9 due, see rules) 1 - 14
37 Dec Mon 05 Lecture: Integration: Endocrinology of Aging / Homeostatic Failure Model 1 - 14
38 Wed 07 Lecture: Integration: Endocrine Case Studies as an integration tool 1 - 14
39 Wed 07 Recitation: Integration: Rhythms, Immunity, Repro, Age (Q10 due, see rules) 1 - 14
40 Mon 12 REVIEW - Material from meeting #30 through meeting #39 1 - 14

Deadline for submitting final recitation homework for grading (EXAM #4) 1 - 14
41, 42 Wed 14 EXAM #3 - 25% final grade (meetings #1 through #40) 1 - 14
EXAM #4 - 25% final grade (mean weekly recitation answers) 1-14
Deadline for submitting final recitation homework for grading (EXAM #4) 1-14
43, 44 Wed 14 EXAM #3 - 25% final grade (meetings #1 through #41) 1-14
EXAM #4 - 25% final grade (mean weekly recitation answers) 1-14

Exams: There are no make-up exams. If a student has a valid problem with an exam date, it must be discussed with the instructor BEFORE the exam. If a student fails to do so and does not show up to take the exam at the appointed time, a grade of “F” might be assigned for the missing exam at the discretion of the instructor. Students will have the opportunity to review each of their exams and Scantron forms within a few days after each exam. The letter and % grade equivalence are: A=91-100%; B+=86-90%; B=81-85%; C+=76-80%; C=71-75%; D=61-70%; F=0-60%. Each student final grade will be curved to a 75% class average, or up to the highest single student grade (100%), whichever come first.

Textbook: Students should have unlimited access to the textbook: “Basic Medical Endocrinology” 4th Edition, by H. Maurice Goodman, Academic Press, 2009. This books will be available at the Cook-Douglass Bookstore on the Cook / Douglass Campus, and also at the Rutgers Fennen Mall College Bookstore.

Preparing for this course: This is an intense course that will cover all of the bodily systems. There will be a large amount of material to understand. It is expected that all students in the class have a solid background from material they studied in biology and chemistry, as this information will serve as the foundation to discuss various endocrine systems / processes.

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Type of exams questions: They will be multiple choice and true / false questions, as the following:

Amine hormones
a. originate from tyrosine an aminoacid
b. include some of the sex hormones
c. all contain iodine in their molecule
d. all of the above
e. none of the above
Steroids and thyroid hormones could increase the number of membrane receptors, which might increase production of cyclic nucleotides, leading to an increase cellular responses to hormones acting on the plasmalemma.
a. true b. false

The recitation section of the Endocrinology course
In the first recitation meeting we will review main concepts about active learning. In addition we will talk about draft versions of the answers you must submit each week (see below for weekly question and deadline). You will be able to e-mail your first draft of each weekly question (by the deadline indicated in each question) for instructor’s comments about your draft answer. Your e-mail with the final edited version of all weekly questions must be received by 8AM on Dec 07, and it will be graded as your EXAM #4. Remember that a well-edited answer should be no more than one-page long. We will discuss the rules and goals of these questions and their relationship with the lectures, in the first recitation meeting. Thus, the main punch-line is:
The average grade of your recitation answers is your exam #4. It has the same weight as each of your other exams (25%), and is an essay with ten questions (one per week) whose answers you might edit before submitting them for grading (before Dec 07).
Recitation answers must have the outline shown below. Final answers that are not following this outline (sub-questions a, b, c, d, see below) will get a 20% grade (F).
The four sub-questions to be used in answering most recitation questions are:
a. Name the structure and the function on which your overall answer will be based? Be as specific as you can in delimiting the boundaries of your example (the most important part of your answer, since the following b, c, & d sub-questions are based on your answer to this first sub-question, a). Please notice that only 1 item is required (in your answer it should be labeled as “a”). This answer should look like: “a.- My structure (S) is …. and its function (F) is …”. In same cases a second sentence might be needed.
b. Why do you think that your structure and your function are related? Support your contention based on 3 lines of evidence based on the chemistry, physics, anatomy, or physiology involved in your example. Please notice that 3 items are required (answers should be labeled as “b1, b2, and
b3”). One of these answers might look like: “b1.- If I do this experiment and measure this variable using this technique, this result will suggest that my S/F is correct”. Please notice that MY question does not ask you to tell me what happens, since this can be copy from any source, but it asked how do you know that your S/F relationship is true.

c) Which are the levels of organization involved in your example (c1)? Cite events occurring at its main level of organization (c2) and indicate how they relate to the whole body level (c3). Please notice that 3 items are required (thus, answers should be labeled as “c1, c2, and c3”). These answers should look as follows: “c1.- molecular” or any level of organization involved in your “a” answer (S/F); “c2.- the first event is …; the next even is …; the middle event is …; the next event is …; the last event is …”. Five events distributed equidistant from each other is a good summary for the story line of the S/F named in your “a” answer. Finally, “c3.- at a whole individual level my S/F described in “a” has this role”.

d) Which are the main feedback mechanisms involved in your example (cite at least two) (d1)? Expand on one of them (d2) and name 2 absolute requirement for that feedback to work (d3). Please notice that 3 items are required (answers should be labeled as “d1, d2, and d3”). These answers should look as follows: “d1.- an increase in this negative feedback ligand must decrease this variable under control”. This is how you NAME a negative feedback. For d1 you need to name two negative feedbacks; “d2.- the first event is …; the next even is …; the middle event is …; the next event is …; the last event is …”. Five events distributed equidistant from each other is a good summary for the most important negative feedback story line, involved as a control of the your S/F named in your “a” answer, that you named in d1; “d3.- these two components are absolutely necessary for the negative feedback, described in d2, to be operational.

Students e-mail answers must be received by 8AM on the Monday of the week when the recitation will be discussed (see course schedule above and / or each question below for its deadline). Students will receive e-mail comments from the instructor by the following week. You may use comments to edit your answers before submitting them for final grading (Dec 07), or for discussing additional draft answers during office hours as many times as you want. Only answers received by each weekly deadline will receive e-mail comments from the instructor. Furthermore, If you want comments, e-mail each weekly answer in the body of your e-mail (NOT as attachment) and state in the subject of the e-mail “ENDO” and your last name followed by the homework number. Instructor comments will be preceded by the letters “JP.” in his answer to your e-mail, written below each of your sub-question’s answers (a, b, c, d).

The recitation weekly questions are as follows:

**Question #01: Hormone action of a lipo-soluble ligand**

Your first draft report for this topic is due on Mon Sept 07. The question for this week is as follows: Select a homeostatic event and / or physiological system involving a lipo-soluble ligand as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #02: Hormone action of a water-soluble ligand**

Your first draft report for this topic is due on Mon Sept 14. The question for this week is as follows: Select a homeostatic event and / or physiological system involving a water-soluble ligand as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #03: The hypothalamic pituitary unit**

Your first draft report for this topic is due on Mon Sept 21. The question for this week is as follows: Select a homeostatic event and / or physiological system involving an hypothalamic – pituitary unit as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #04: The endocrinology of Ca or thyroid control**

Your first draft report for this topic is due on Mon Sep 28. The question for this week is as follows: Select a homeostatic event and / or physiological system involving calcium OR thyroid regulation as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #05: The ANS and the GI hormones**

Your first draft report for this topic is due on Mon Oct 12. The question for this week is as follows:
Select a homeostatic event and / or physiological system involving BOTH the autonomic nervous system AND a gastrointestinal hormone as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #06: Control of intermediary metabolism**
Your first draft report for this topic is due on Mon Oct 19. The question for this week is as follows:
Select a homeostatic event and / or physiological system involving the regulation of intermediary metabolism basic processes (e.g. glycogenesis, gluconeogenesis, lipolysis) as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #07: Growth and blood pressure regulation**
Your first draft report for this topic is due on Mon Oct 26. The question for this week is as follows:
Select a homeostatic event and / or physiological system involving growth OR blood pressure regulation as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #08: Control of the onset of puberty, cyclicity and aging**
Your first draft report for this topic is due on Mon Nov 09. The question for this week is as follows:
Select a COMMON homeostatic event and / or physiological system involving the regulation of the onset of puberty, cyclicity AND aging as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #09: Control of food intake and reproduction**
Your first draft report for this topic is due on Mon Nov 16. The question for this week is as follows:
Select a homeostatic event and / or physiological system involving food intake AND reproduction as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).

**Question #10: Rhythms, reproduction, immunity and aging**
Your first draft report for this topic is due on Mon Dec 30. The question for this week is as follows:
Select a homeostatic event and / or physiological system involving rhythms, reproduction, immunity AND aging as your structure, in which you can show the importance of structure / function relationship, levels of organization, and feedback control. Your answer must follow the outline presented in the introduction (sub-questions a, b, c, d, see above).