Endocrinology

Syllabus for ADVS/BIOL 5630/6630

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Utah State University
ADVS/BIOL 5630/6630: Endocrinology

Instructor
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Office hours: Thurs. 3 to 4:30 pm, by appointment
or contact via Canvas

Course Information
ADVS/BIOL 5630/6630: Science Communication
Fall 2017, Tues/Thurs 1:30 to 2:45 pm
Location: AGRS 141
Course credit: 3 credit hours

Course Description
This course will focus on the endocrine system, specifically, the molecular, cellular and physiological functions of hormones in health and disease. Major course topics are outlined at the end of this syllabus in the course schedule. The primary organs of the endocrine system will be reviewed, including the brain, pituitary gland, gonads, liver, pancreas, adrenal gland and the thyroid. Lectures will also focus on mechanisms of hormone action and several key hormone types will be discussed, including sex steroid hormones, tropic hormones, thyroid hormones, eicosanoids, glucocorticoids and catecholamines. Endocrine control of physiological process will be reviewed, including cell proliferation, growth and differentiation; reproduction; digestion and metabolism; and stress responses. This course will also include a significant comparative component, where endocrine systems and hormone function in different species will be compared, including mammalian and non-mammalian species important for agriculture, as companion animals and as key environmental species. Clinical aspects and diseases associated with dysfunction of the endocrine system will also be discussed, including two guest lecture case studies on endocrine-related health problems. Finally, the impact of endocrine-disrupting chemicals on animal and human health will be discussed. This course will be reading and writing intensive, with short critical summaries of recent scientific papers in the field of endocrinology serving as the primary out-of-class assignment. This course should provide students who have an interest in biological sciences or who intend to pursue a medical or veterinary career with a strong foundational understanding of the role of hormones and endocrine organs in animal physiology.

Prerequisites
Students are required to have completed the BIOL 1610/1620 series with a passing grade.

Course Objectives
- Students should gain a broad understanding of hormone regulation of physiology in vertebrates
- Students should understand the principals of hormone-receptor interaction
- Students should understand the major endocrine axes, including positive and negative feedback effects of hormones
- Students should learn how the endocrine system functions in a healthy organism, and have familiarity with pathologies that arise when disruption of this system occurs, either due to disease or environmental insult
- Students should develop skills of critical review of primary scientific literature in the field of endocrinology and develop skill in scientific writing through preparation of article summaries.
- Graduate students should gain in-depth understanding of a specialized topic in the field of endocrinology as part of their term paper assignment.

Instructor Availability & Communication
"Office" hours
I will have regularly scheduled open office hours for you to discuss the course materials or assignments. Occasionally, I will hold these "office" hours at a location outside my office, such as a café or on the quad to be more accessible to students who may feel intimidated by the office environment. To meet at a different time or location, please contact me by email to schedule an appointment. Please do not simply drop by my office. I would prefer to meet with you either during my designated office hours or at a scheduled appointment so that I may devote my undivided attention to your needs.

Why come to office hours? This dedicated time allows me to touch base with your progress or concerns or to get to know you as a student. Come see me to clarify issues regarding assignments or grading. Better yet, come see me to discuss how this class can help you on the right trajectory for your career. Or to discuss your interests in outside-of-class
activities, such as research or our College organizations. Come see me if you have non-academic concerns and need guidance on University resources. Or come see me just to say hello!

**Student Feedback/Communication**

I welcome all feedback on the course. My preferred method of communication with individual students is via email via Canvas – NOT my USU email address. This is critical for me to keep track of student communications, which can easily be lost in the midst of my regular email. Generally, I will respond to your message **within two working days** (Monday – Friday), so timely communication with respect to assignments and exams is critical. Messages sent late Friday may not have a response until early the following week, so plan accordingly.

**Course Resources**

*Infrastructure Canvas*

Canvas is a Learning Management System which we will use for our course. You can login to Canvas at [https://online.usu.edu/](https://online.usu.edu/). Your username is your A#, and your password is your global password (the same one you use for Banner or Aggiemail). Student tutorials for using Canvas are available online at [https://online.usu.edu/support/canvasStudent.cfm](https://online.usu.edu/support/canvasStudent.cfm). You may expect to find on Canvas the syllabus, assignment descriptions, any supplemental reading materials and your posted grades. Feel free to use this system for group discussions outside of class, though communication to me would be best via regular email (see below).

*Software*

Documents in this course will be presented in .pdf format where possible. You will need Adobe Reader to view these files, which you can obtain for free at [http://get.adobe.com/reader/](http://get.adobe.com/reader/).

Written assignments may be prepared using Microsoft Word document (.docx) or other comparable word processing or presentation software. Presentation assignments may be prepared using Microsoft PowerPoint document (.pptx) or other comparable word processing or presentation software. If you do not have Word or PowerPoint installed on your computer, you may use Open Office Writer or GoogleDocs instead, which you can obtain for free at [http://www.openoffice.org/](http://www.openoffice.org/) or [https://www.google.com/docs](https://www.google.com/docs).

*Textbook(s)*

The primary text for this class will be *Vertebrate Endocrinology*, 5th Edition by D.O. Norris and J.A. Carr, published by Elsevier, ISBN 978-0-12-394815-1. You may purchase this book at the bookstore or online. Make sure you to purchase the correct edition! This text is required, and students are expected to complete assigned readings as part of their preparation for exams.

An additional electronic book may also be used to supplement the above text, *The Endocrine System* by Ben Greenstein and Diana Wood (2011). This text can be accessed via USU’s ebrary site using your A# and strong password at [http://ebookcentral.proquest.com.dist.lib.usu.edu/lib/usu/reader.action?docID=822534](http://ebookcentral.proquest.com.dist.lib.usu.edu/lib/usu/reader.action?docID=822534). If this will be your first experience using the ebrary online book site, please review the orientation information provided under the “getting started” section. Often, consulting another source is useful to see how others depict pathways, structures, etc. You may find that one author’s approach may make more sense to you than another. The diagrams in this text are quite good, and each unit provides an excellent “overview” diagram showing key concepts “at a glance.”

**Course Activities**

*Readings*

The course schedule at the end of the syllabus indicates a proposed schedule of readings from the primary text *Vertebrate Endocrinology*, which will occasionally be supplemented with materials from the supplementary text and/or journal articles. You are expected to complete all readings before attending the lecture.

*Lecture materials*

Lectures will be focused on synthesis and expansion of the reading materials, so it is your responsibility to gain a basic understanding of the reading materials first. PowerPoint lectures will be posted on Canvas prior to presentation in class. The slides will be provided as a .pptx file which can be viewed on your computer, downloaded and printed. Please note that these slides should not be your only source of information in this course; the slides should be used to supplement your lecture and reading notes. Please review the USU Academic Resource Center Idea Sheet on effective note taking. [http://www.usu.edu/arc/idea_sheets/pdf/effective_note_taking.pdf](http://www.usu.edu/arc/idea_sheets/pdf/effective_note_taking.pdf)
Assessments
Exams and quizzes will be designed to evaluate your comprehension of endocrine concepts; they will cover information presented in reading assignments, lectures and class discussions. In anticipation of the questions, “Will that be on the exam?” and “Do we need to know this?” The answer will invariably be “Yes!” Make special note of lecture content marked in bold or marked with a star, as this material is deemed particularly important. Exams are structured to test the depth of your knowledge and the accuracy of your comprehension. Quizzes are designed for you to gauge your current level of understanding of topics and to serve as study resources for exams.

Quizzes
You will be assigned eight “no-pressure” quizzes hosted on Canvas. These quizzes will consist of approximately ten multiple choice, fill in the blank, matching and/or true/false questions based on the readings and presentations. Consider these quizzes as an opportunity to gauge what you have learned, thus far, and to identify learning objectives that need further attention prior to the section/final exam. To get the most out of these quizzes, you should complete all readings and view the presentation before you take the quiz. You may choose to retake the quiz as many times as you like prior to the due date to obtain the maximum possible points.

Exams
There will be four section exams and one comprehensive final exam for this course, as outlined in the schedule posted below. This constitutes a change from prior years that included only three mid-terms and a final; a common complaint in past years was that exam 1 was too intense and covered too much material. To address this concern, that material is now split into two separate exams at the first of the term. This strategy reduces the content covered on the very first exam, but does require that exam 1 will occur quite soon in the schedule. Students are advised to begin preparing for exam 1 quickly.

Each exam will include short answer and essay style questions. Although proper grammar and spelling are not the most important endpoints for evaluation in these exams, I highly recommend that you leave time at the end of each exam period to review your answers. Because writing skills are critical to a career in the sciences, I reserve the privilege to deduct points for examples of grotesquely poor writing or grammar. Review the USU Academic Resource Center Idea Sheet on essay exam preparation. http://www.usu.edu/arc/idea_sheets/pdf/essay_exam_prep.pdf

Communication Intensive Activities
Take home exam essay question
Each section exam will include two essay questions from which you choose one to answer during the exam. The other question must also be answered, but as a take home essay writing assignment. Using any available resources at your disposal, you must provide a comprehensive, well-written and well-organized answer to this question, including appropriate citation of relevant source material (excluding lecture notes and text book).

The essay response may be any length that you consider appropriate to answer the question, but should be no less than 500 words in length. You may construct diagrams or obtain figures that illustrate key points (include citations as needed), but you may not use material from the lecture slides. (Composing your own diagrams/figures is another good process by which to learn key material). Because this essay is “take home” with ample opportunity for careful revision and editing, writing quality will be considered in the evaluation, including elements of content organization, sentence structure and grammar. Please review the writing rubric at the end of this syllabus as a guide for how writing assignments will be reviewed.

Due date: The take home essay is due 48 hrs following the exam and should be submitted online via Canvas.

Article summaries
A major assignment for this course is the preparation of four summaries of primary research articles on subjects related to the course content. Each review will be on a separate original research article, and each article must be on a different topic related to endocrinology. A folder with suitable articles will be available on Canvas, or you may identify another endocrinology paper from one of the suitable journals listed below. The paper must be primary research; reviews, commentaries, or other publication types are not suitable for this assignment.

Trends in Endocrinology and Metabolism
Diabetes, Obesity and Metabolism
Endocrine-Related Cancer
Journal of Endocrinology and Metabolism
Journal of Endocrinology
Thyroid
European Journal of Endocrinology
The objectives of this assignment are to help familiarize students with current research in the field of endocrinology, develop skills for evaluating primary science sources, and develop skills in science communication.

Detailed guidelines for preparation of the reviews are posted on Canvas under “Assignments.” Briefly, each review should address the following questions in language suitable for a broad audience:

- What is the knowledge gap or research problem?
- What was the hypothesis and/or objective?
- What did the researchers do?
- What did they find?
- What do their observations mean? and
- Why should I (or the broader community) care?

Format requirements: 1.5 line spacing, 1” margins on all sides, and 12pt Times New Roman font; the article summary should be about 800 to 1000 words in length.

For each summary, you will receive instructor feedback on content, tone and writing style based on the writing rubric included in this syllabus. You should take this feedback into account in preparation of a revision of the article.

Peer review: Also, each assignment will receive anonymous peer reviews from at least two other students in the course. Participation in peer reviews is required (5 pts per review). Peer reviews will afford students the opportunity to learn how to identify writing problems through revising others’ work. Students will provide peer review via mark up using comments/track changes, a rubric in Canvas and a brief written summary assessment (1 paragraph, approx. 150 words). The written assessment must be prepared using professional language in a technical style. Failure to submit your own article summary by the due date and time means that you will not be assigned others’ work for peer review.

Oral presentation of selected summary
Students will select one of their selected papers for which they prepared a summary (see above) to also prepare a short oral presentation using PowerPoint, Prezi or other presentation software. The students will generate a podcast (video screen capture and audio) of their presentation to upload to Canvas. This presentation will require the student to expand their consideration of the topic to include evaluation of other key sources cited by the original science article or other sources identified by the student as germane to the topic. The structure of the recording will follow that of the summary already prepared (see above). The style of delivery should be suitable for a general audience interested in science, such as short science stories presented by the College of Science’s “science-by-the-slice” segments for Utah Public Radio (example recordings will be provided on Canvas). This style would avoid the use of jargon or complicated language that can make scientific topics difficult for the public to understand. The presentation should be about 4 to 6 minutes long, which is just a little shorter than a typical student speaking slot at a university research symposium. As such, the content should include approximately 5 to 6 slides, although fewer or more slides may be appropriate to match the student’s speaking style and pace. Student may use content from the original article in their presentations, but they must include appropriate attribution. Any figures or images used must be original, open source (e.g., Wikimedia commons) or appropriately cited.

A draft recording will be due at about week 12 of the course, for which the student will receive instructor feedback on content, tone and speaking style based on the presentations rubric included in this syllabus. Also, each recording will receive anonymous peer reviews from two other students in the course. For this presentation, peer reviewers will take on
the role of a non-expert, public audience and provide feedback on accessibility of the material. Participation in peer reviews is required (5 pts per review). Students will provide peer review via mark up using comments/track changes, a rubric in Canvas and a brief written assessment (1 paragraph, approx. 150 words). Failure to submit your own article summary by the due date and time means that you will not be assigned others' work for peer review.

Students should implement critiques from the instructor and students to revise their presentation for final submission at the end of the term.

**Requirements for Graduate Students registered for ADVS/BIOL 6630**

Students who register for this course for graduate level credit must fulfill two additional requirements for course completion.

1. Graduate students are expected to write a term paper of approximately 12 pages (double-spaced with 1” margins and Times New Roman font); this paper should be a critical review (as opposed to a general survey) in an area related to endocrinology. Example topics are listed below, though the student is welcome to choose a topic of interest to him/her as long as it is substantially different from the student’s primary area of research. The paper topics must be approved by the instructor, and the topic may extend from one of the article summaries written earlier in the term. Deadlines for the graduate student paper are outlined on Canvas.

   - Hormonal regulation of testicular or ovarian function
   - Hormones and carcinogenesis
   - Discovery of steroid membrane receptors
   - Use of hormones in livestock production
   - Regulation of growth hormone release
   - Biological rhythms
   - Mechanism of action of insulin
   - Autoimmunity and endocrine disease
   - Molecular biology of peptide and protein hormone regulation and biosynthesis
   - Hormone control of satiety
   - Role of prostaglandins in the reproductive system
   - The endocrine disruptor hypothesis
   - Temperature-dependent sex determination in reptiles

2. Graduate students must prepare a 15-minute seminar on their selected topic for presentation to the class during the last week of the term. Presentations should be prepared using Microsoft PowerPoint (or the equivalent) and submitted in draft form to the instructor for critical review (see Canvas for due date). Students will present their final seminar during the last week of class. This seminar may be an extension of the recorded short presentation (see above under Communication Intensive Activities), but should be more substantial and use additional resources for expanded content.

**Course Policies**

*Late Work*
Late work due to procrastination will not be accepted. Late work due to legitimate emergency may be accepted. The due dates and times associated with each quiz, exam and paper review are stated clearly in Canvas.

*Student attendance policy*

Students will not receive credit for attending class. A college education should provide students with experience and skills for adult professional life. Frankly, one rarely gets credit in life for just showing up.

I expect you to communicate with me at the earliest reasonable opportunity if you experience a legitimate emergency that will prevent you from completing required coursework on time. Please state the nature of the emergency, and when you expect to complete the coursework.

**Examples of legitimate emergencies** or reasons for missing class include (but are not limited to):

- death or serious illness of immediate family member (parent, sibling, spouse or child)
- serious illness or injury to the student requiring medical care or hospitalization (note required)
- unexpected severe inclement weather or unavoidable hazardous road conditions
- university-sanctioned educational events
- mandatory court appearance

**Examples of poor excuses that would not constitute an emergency** include (but are not limited to):

- being stopped for a traffic ticket on your way to campus
• a simple stuffy nose or cold (though please take care to practice good hygiene – Kleenex and hand sanitizer!)
• alarm clock failure
• didn’t feel like taking the exam or needed more time to study

Please remember: An emergency on your part does not necessarily constitute an emergency on my part!

Missed exam policy

All exams in this course are mandatory.

To maintain fairness among all students in the course, there will be no opportunity to make up missed section exams. Should you miss one of the section exams due to a legitimate emergency or pre-approved cause (such as a serious illness or university-sanctioned academic event), your comprehensive final exam score will count for those extra points as well (e.g., if exam 3 is missed, the final will count for 250 points as opposed to 150 points). Note that this adjustment will be made manually to the final score, rather than within Canvas. For example, if your score on your final exam is 86%, then you’d receive 86% of the points for your missed exam (86 out of 100) and 86% of the points for the final (129 out of 150) for a total of 215 points.

If, however, you miss a mid-term exam without appropriate justification, you will receive no points for that exam and your final will constitute the regular total of 150 points. If you expect to miss more than two of the section exams, please contact me to discuss the situation.

Should you miss the final exam, YOU MUST CONTACT ME ASAP!! The final may be rescheduled at my discretion, but must take place prior to December 15th. Be aware that an alternative, likely more challenging, final exam will be administered to any student who cannot attend the regularly scheduled final exam session. A student who cannot complete the final exam due to an unforeseen event (personal illness or death in the immediate family) will be encouraged to take an incomplete in the course.

University Policies

Honor Pledge

Students will be held accountable to the Honor Pledge which they have agreed to: “I pledge, on my honor, to conduct myself with the foremost level of academic integrity.”

Academic Dishonesty

The Instructor of this course will take appropriate actions in response to Academic Dishonesty, as defined the University’s Student Code:

Acts of academic dishonesty include but are not limited to:

1. Cheating: (1) using or attempting to use or providing others with any unauthorized assistance in taking quizzes, tests, examinations, or in any other academic exercise or activity, including working in a group when the instructor has designated that the quiz, test, examination, or any other academic exercise or activity be done “individually”; (2) depending on the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems, or carrying out other assignments; (3) substituting for another student, or permitting another student to substitute for oneself, in taking an examination or preparing academic work; (4) acquiring tests or other academic material belonging to a faculty member, staff member, or another student without express permission; (5) continuing to write after time has been called on a quiz, test, examination, or any other academic exercise or activity; (6) submitting substantially the same work for credit in more than one class, except with prior approval of the instructor; or (7) engaging in any form of research fraud.
2. Falsification: altering or fabricating any information or citation in an academic exercise or activity.
3. Plagiarism: representing, by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes using materials prepared by another person or by an agency engaged in the sale of term papers or other academic materials.

Full text of the Student Code available at http://www.usu.edu/studentservices/studentcode/

Plagiarism will not be tolerated. Please review the following information on plagiarism:

• http://www.plagiarism.org/plag_article_what_is_plagiarism.html
• http://www.plagiarism.org/plag_article_educational_tips_on_plagiarism_prevention.html
Students with disabilities
Students with ADA-documented physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations. Veterans may also be eligible for services. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, (435)797-2444 voice, (435)797-0740 TTY, (435)797-2444 VP, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible.

Grading
Your grade will be based on the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>5630 Points</th>
<th>6630 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exams and quizzes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quizzes (7 @ 10 points each, drop lowest)</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Section exams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exams 1 &amp; 2 (75 points each)*</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Exams 3 &amp; 4 (100 points each)</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Comprehensive final exam</td>
<td>150</td>
<td>150</td>
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<tr>
<td>Communication intensive components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exam take home essays (4 @ 15 points each)</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Article summaries (4 @ 20 points each)</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Recorded presentation of selected summary</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Peer reviews (5 assignments x 2 reviews @ 5 points each)</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Components for 6630 designation (graduate students)</td>
<td></td>
<td></td>
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<tr>
<td>Term paper</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>Mini-seminar</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Total Points</td>
<td>800</td>
<td>900</td>
</tr>
</tbody>
</table>

* Exams 1 and 2 will contain material that was originally covered in a single exam. Thus, the amount of material covered in these two tests will be less than subsequent mid-terms, and the point totals reflect this difference.

Your grade will be calculated using the following scale:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93% to 100%</td>
</tr>
<tr>
<td>A-</td>
<td>90% to 92%</td>
</tr>
<tr>
<td>B+</td>
<td>87% to 89%</td>
</tr>
<tr>
<td>B</td>
<td>83% to 86%</td>
</tr>
<tr>
<td>B-</td>
<td>80% to 82%</td>
</tr>
<tr>
<td>C+</td>
<td>77% to 79%</td>
</tr>
<tr>
<td>C</td>
<td>73% to 76%</td>
</tr>
<tr>
<td>C-</td>
<td>70% to 72%</td>
</tr>
<tr>
<td>D+</td>
<td>67% to 69%</td>
</tr>
<tr>
<td>D</td>
<td>60% to 66%</td>
</tr>
<tr>
<td>F</td>
<td>&lt;60%</td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
</tr>
<tr>
<td>------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>29-Aug</td>
<td>1. Introduction</td>
</tr>
<tr>
<td>31-Aug</td>
<td>2. Bioregulators</td>
</tr>
<tr>
<td>5-Sep</td>
<td>2. Bioregulators</td>
</tr>
<tr>
<td>7-Sep</td>
<td>2. Bioregulators</td>
</tr>
<tr>
<td>12-Sep</td>
<td><strong>Exam 1</strong></td>
</tr>
<tr>
<td>14-Sep</td>
<td>3. Hypothalamic-Pituitary System</td>
</tr>
<tr>
<td>19-Sep</td>
<td>3. Hypothalamic-Pituitary System</td>
</tr>
<tr>
<td>21-Sep</td>
<td>3. Hypothalamic-Pituitary System</td>
</tr>
<tr>
<td>26-Sep</td>
<td><strong>Exam 2</strong></td>
</tr>
<tr>
<td>28-Sep</td>
<td>4. Hypothalamus-Pituitary-Adrenal axis</td>
</tr>
<tr>
<td>3-Oct</td>
<td>4. Hypothalamus-Pituitary-Adrenal axis</td>
</tr>
<tr>
<td>5-Oct</td>
<td>Case study #1 with Dr. Rood (Dr. B out of town)</td>
</tr>
<tr>
<td>10-Oct</td>
<td>5. Hypothalamus-Pituitary-Thyroid axis</td>
</tr>
<tr>
<td>12-Oct</td>
<td>5. Hypothalamus-Pituitary-Thyroid axis</td>
</tr>
<tr>
<td>17-Oct</td>
<td><strong>Exam 3</strong></td>
</tr>
<tr>
<td>19-Oct</td>
<td>No class (Friday class schedule for Fall break)</td>
</tr>
<tr>
<td>24-Oct</td>
<td>6. Reproduction - Males</td>
</tr>
<tr>
<td>26-Oct</td>
<td>6. Reproduction - Females</td>
</tr>
<tr>
<td>31-Oct</td>
<td>6. Reproduction - Females</td>
</tr>
<tr>
<td>2-Nov</td>
<td>6. Reproduction - Clinical and comparative</td>
</tr>
<tr>
<td>7-Nov</td>
<td><strong>Exam 4</strong></td>
</tr>
<tr>
<td>Date</td>
<td>Task</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>9-Nov</td>
<td>7. Bioregulation of digestion</td>
</tr>
<tr>
<td>14-Nov</td>
<td>7. Bioregulation of digestion</td>
</tr>
<tr>
<td>16-Nov</td>
<td>7. Bioregulation of digestion</td>
</tr>
<tr>
<td>21-Nov</td>
<td>Case study #2 with Dr. Rood</td>
</tr>
<tr>
<td>26-Nov</td>
<td>No class (Thanksgiving Holiday)</td>
</tr>
<tr>
<td>28-Nov</td>
<td>8. Calcium and phosphate homeostasis</td>
</tr>
<tr>
<td>30-Nov</td>
<td>9. Endocrine disruption</td>
</tr>
<tr>
<td>5-Dec</td>
<td>Graduate student seminars</td>
</tr>
<tr>
<td>7-Dec</td>
<td>Review</td>
</tr>
<tr>
<td>TBA*</td>
<td>Final Exam</td>
</tr>
</tbody>
</table>

* Final exam will be administered according to the USU exam schedule for fall 2017; dates/times have not yet been announced by USU.
**Rubric for evaluation of writing**

<table>
<thead>
<tr>
<th>Category</th>
<th>Excellent</th>
<th>Good</th>
<th>Okay</th>
<th>Poor</th>
</tr>
</thead>
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<td>Focus and details</td>
<td>There is one clear, well-focused topic. Main ideas are clear and are well supported by detailed and accurate information.</td>
<td>There is one clear, well-focused topic. Main ideas are clear but are not well supported by detailed information.</td>
<td>There is one topic. Main ideas are somewhat clear.</td>
<td>The topic and main ideas are not clear.</td>
</tr>
<tr>
<td>Organization</td>
<td>The introduction is inviting, states the main topic and provides an overview of the paper. Information is relevant and presented in a logical order. The conclusion is strong.</td>
<td>The introduction states the main topic and provides an overview of the paper. A conclusion is included.</td>
<td>The introduction states the main topic. A conclusion is included.</td>
<td>There is no clear introduction, structure or conclusion.</td>
</tr>
<tr>
<td>Voice</td>
<td>The author’s purpose of writing is very clear, and there is strong evidence of attention to audience. The author’s extensive knowledge and/or experience with the topic is/are evident.</td>
<td>The author’s purpose of writing is somewhat clear, and there is some evidence of attention to audience. The author’s knowledge and/or experience with the topic is/are evident.</td>
<td>The author’s purpose of writing is somewhat clear, and there is evidence of attention to audience. The author’s knowledge and/or experience with the topic is/are limited.</td>
<td>The author’s purpose of writing is unclear.</td>
</tr>
<tr>
<td>Sentence structure, grammar, mechanics and spelling</td>
<td>All sentences are well constructed and have varied structure and length. The author makes no errors in grammar, mechanics and/or spelling.</td>
<td>Most sentences are well constructed and have varied structure and length. The author makes a few errors in grammar, mechanics and/or spelling, but they do not interfere with understanding.</td>
<td>Most sentences are well constructed, but they have a similar structure and/or length. The author makes several errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
<td>Sentences sound awkward, are distractingly repetitive or are difficult to understand. The author makes numerous errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
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</table>
### Rubric for evaluation of presentations

<table>
<thead>
<tr>
<th>Category</th>
<th>Excellent</th>
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</tr>
<tr>
<td><strong>Visual attributes; Use of diagrams, figures and tables</strong></td>
<td>The design is polished with a very professional appearance. Slides are visually pleasing and aid the viewer in comprehension of presented material. Figures, tables and other diagrams are quickly interpreted and appropriate to the topic discussed.</td>
<td>The design is polished. Slides are visually pleasing and aid the viewer in comprehension of presented material. Figures and other diagrams are included.</td>
<td>The design is not offensive, but does not look polished or professional. Use of figures, diagrams and tables does not facilitate understanding of the material presented.</td>
<td>The design detracts greatly from the presentation content and/or is not visually pleasing. Use of figures, tables and/or diagrams is poorly executed and does not facilitate understanding of the material presented.</td>
</tr>
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<td><strong>Sentence structure, grammar, mechanics and spelling</strong></td>
<td>Titles to the slides provide key information to guide the audience through the talk. The text is concise and accurately conveys important concepts; text is well-organized using bulleted or numbered lists. The presenter makes no errors in grammar, mechanics and/or spelling.</td>
<td>Titles are relevant to the slide/section content. Modest amounts of text are used; text is well-organized using bulleted or numbered lists. The presenter makes few errors in grammar, mechanics and/or spelling.</td>
<td>Titles to the slides are included, but are not very useful in guiding the audience through the talk. The presenter uses more text than is necessary. The presenter makes several errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
<td>Titles to the slides are not relevant to the text or the author's discussion of the slide content. The presenter uses excessive text. The presenter makes numerous errors in grammar, mechanics and/or spelling that interfere with understanding.</td>
</tr>
<tr>
<td><strong>Presenter skills</strong></td>
<td>Presenter speaks easily with confidence, enthusiasm and authority on the topic. Presenter keeps on topic and spends an appropriate amount of time on each slide/figure. Presenter follows guidelines for presentation length/size. The presenter appears very comfortable with the technology. Presenter answers questions with respect and clear evidence of knowledge.</td>
<td>Presenter speaks easily on the topic. Presenter spends an appropriate amount of time discussing each slide. Presenter follows guidelines for presentation length/size. Presenter is comfortable with technology and attempts to answer questions.</td>
<td>Presenter appears unrehearsed and unfamiliar with some presentation content. Presenter spends too much time on some sections of the presentation. Presenter goes beyond the guidelines for length/size of the presentation. Presenter is unable to answer questions, or has difficulty working with the technology.</td>
<td>Presenter becomes flustered or agitated during presentation. Presenter is unfamiliar with presentation content, tends to read text directly from the slide. Presenter does not follow guidelines for length/size at all. Presenter becomes combative when answering questions or is unable to do so. Presenter has difficulty working with the technology.</td>
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</tbody>
</table>
Learning objectives for each lecture unit

Lecture 1 – Endocrine System & Organization

- Understand organization of endocrine systems at whole organism, tissue and cell levels
- Know definitions of key terms (e.g., endocrine vs. exocrine; paracrine vs. autocrine)
- Understand and be able to conceptualize homeostasis, negative and positive feedback loops
- Know the basic types of cell surface and nuclear receptors
- Be able to outline scientific method, describe elements of good experiment design
- Understand different patterns of dose-response relationships
- Be familiar with several types of experimental approaches and tools commonly used in endocrinology research

Lecture 2 – Synthesis, Metabolism and Actions of Bioregulators

- Be able to describe the life history of a hormone
- Know typical structures of catecholamines, indoleamines, peptides and proteins
- Know specific structures of model compounds (e.g., DA, NE, E, melatonin, insulin)
- Understand synthesis, release and metabolism pathways for amines, peptides and proteins
- Know what types of receptors are activated by amines, peptides/proteins (be able to give specific examples)
- Understand concepts of second messengers and kinase cascade
- Be able to describe specific examples of second messenger molecules
- Understand concept of cross talk
- Know the basic structure of steroid hormones
- Be able to identify estrogens, androgens, corticosteroids and progestogens, vitamin D3
- Know the specific structures of cholesterol, estradiol, testosterone, progesterone and cortisol
- Be very familiar with steroidogenesis pathway, including the major enzymes involved
- Understand the mechanism of steroid hormone action to alter gene expression, and steroid interaction with steroid receptors
- Be familiar with the types of receptors for different steroid ligands
- Know the structures of T3 and T4
- Know the synthesis pathway for thyroid hormones
- Understand (as before) the molecular mechanism by which thyroid hormones exert their activity
- Know how this process differs slightly from steroid hormone action (with respect to receptor homo-/hetero-dimerization)
- Know the different classes of eicosanoids; be sufficiently familiar with example structures to identify them
- Be familiar with the “grab bag” of other bioregulators mentioned

Lecture 3 – Hypothalamus-Pituitary Axis

- Know the four principle hypothalamus-pituitary endocrine axes
- Know the structure of the pituitary (adenohypophysis, neurohypophysis, and all the structural regions)
- Know the cell types of the pars distalis, pars tuberalis and their secreted hormones
- Be familiar with the control regions of the brain involved in regulating pituitary function (esp. PVN, SON)
- Have thorough understanding of the hypothalamo-hypophysial portal system
- Understand the general system of control of hypothalamic hormone release (specific cases will come in later chapters)
- Know the three major groups of tropic hormones, and the major hormones within each group
- Know the major structural differences among the major groups
- For each tropic hormone, be very familiar with:
  - Their site of synthesis
  - The major regulating hormone(s) (i.e., releasing and release-inhibiting hormones)
  - Their major actions
  - What type of receptors they bind
- Know the major nonapeptides
  - Vasopressin (AVP in most mammals)
  - Oxytocin
- Know the major functions of each, where they are made and on what tissues they act
- Know the function of pineal gland, the hormones it produces
- Be familiar with the role of melatonin in regulating biological rhythms
- Be familiar with examples of endocrine disease associated with the hypothalamus
Lecture 4 – Adrenal Axis
- Know the hypothalamus-pituitary-adrenal axis
- Know the structure of the adrenal gland and which steroid or catecholamines are produced in each structure
  - Adrenal cortex: zona glomerulosa, zona fasciculata, zona reticularis
  - Adrenal medulla
  - Fetal zone in mammals
- Understand the role of glucocorticoids in regulating glucose availability
- Be familiar with other actions of glucocorticoids – reproduction and immune system (anti-inflammatory actions)
- Understand the involvement of glucocorticoids during chronic stress response
- Know the primary causes, symptoms and treatments of these diseases
  - Cushing’s syndrome (disease)
  - Addison’s disease
  - Congenital adrenal hyperplasia
  - Hyperaldosteronism
  - Hypoaldosteronism
- Know how these conditions alter production of hormones in the HPA axis, impact on adrenal size
- Be familiar with two examples of HPA axis and stress response in other species (migrating salmon, birds)

Lecture 5 – Thyroid Axis
- Know the structure of the thyroid gland
- Have a very good understanding of the pathways for synthesis and secretion of thyroid hormones
- Know how thyroid hormones exert their effects on gene expression
- Recall regulation of TSH production and understand how thyroid hormones exert feedback on neuroendocrine system
- Know relative importance of $T_3$ versus $T_4$ in all of these points
- Be very familiar with the basic biological actions of thyroid hormones
- Know how thyroid function differs between hypo- and hyperthyroidism
- Know the major symptoms of hypo- and hyperthyroidism
- Be very familiar with Graves’ disease
  - Understand how it is caused by disruption of the thyroid gland
  - Be familiar with the basic treatments
- Know what the most prevalent endocrine diseases are in cats and dogs (they differ!)
- Be familiar with the unique nature of thyroid follicles in bony fishes
- Be familiar with mechanisms of thyroid function in some other species – especially metamorphosis

Lecture 6 – Gonadal Axis
- Know the structures of the male testis, seminiferous tubules and the key cell types participating in endocrine control of gametogenesis
- Know the basic pathway for steroidogenesis in testicular cells (slide 11)
- Understand the biological actions of FSH and LH in regulating testicular function
- Be very familiar with the biological actions of androgens
- Know the steroidogenesis pathway – focus on androgen synthesis
- Know the structures of the female ovary and uterus, including the stages of follicle development and the cell types of the ovarian follicle (i.e., granulosa cells, theca interna and theca externa cells)
- Know the basic pathway for steroidogenesis in ovary (slide 13)
- Use the study sheet (online at Blackboard) to study and learn the ovarian and uterine cycles backwards and forwards
- Know how LH/FSH and steroid hormones regulate ovarian and uterine cycles
- Know the source of chorionic gonadotropin (CG) and its endocrine actions
- Know the hormones produced by the placenta and their endocrine actions
- Have a clear understanding of the role of hormones in parturition, focus on human (slides 10,11) but be able to compare/contrast with sheep and bovine
- Understand the role of hormones in regulating mammary gland development, milk synthesis and milk ejection
- Be familiar with the symptoms, causes (if known) and treatments of reproductive disorders
  - Precocious puberty
• Delayed puberty
• Cryptorchidism
• Polycystic ovarian disease
• Understand how hormone production is disrupted by PCOS
• Understand likely causes, symptoms and treatments for COD in cattle
• Be familiar with genetic reproductive disorders
• Be familiar with vitellogenesis and hormone influence on sex determination

Lecture 7 - Bioregulation of Digestion
• Know what the enteric endocrine system is, and how the GI tract and other endocrine tissues coordinate to regulate digestion and food intake
• Understand the biological actions of four digestive hormones listed: gastrin, CCK, secretin and GIP
• Be familiar with hormones that stimulate and repress appetite (focus on ghrelin and leptin)
• Know the major structures of the mammalian pancreas, the primary cell types and their secreted products
• Know the major endocrine actions of insulin and glucagon
• Know how insulin secretion is regulated, how insulin levels relate to blood glucose levels
• Be very familiar with interaction of liver sugar metabolism, insulin and glucagon release
• Be able to describe causes, consequences and treatments for type I and II diabetes mellitus

Lecture 8 - Calcium and Phosphate Homeostasis
• Know the three major hormones that regulate calcium & phosphate homeostasis
• Know the major organs involved in calcium homeostasis
• Understand the causes, symptoms and treatments for hyper- and hypocalcaemia

Lecture 9 – Endocrine Disruption
• Understand the concept of endocrine disruption and (broad) mechanisms by which chemicals can disrupt endocrine function
• Be familiar with concept of environmental estrogens and selected estrogen mimics
• Be very familiar with at least one model EDC (very likely to pop up on exam as essay question) – use reading resources to expand the lecture discussion
  • Know its source
  • Know its mechanism of action
  • Be able to describe some of its adverse effects