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| **[Dr. Cliff H. Summers](http://usdbiology.com/cliff)**[Churchill-Haines 168F](http://usdbiology.com/cliff) cliff@usd.edu  | USD Department of Biology | [Endocrinology](http://usdbiology.com/cliff/Courses/Endocrinology/Endocrinology%20Syllabus%2018.html)BIOL 432 3 creditsFall 2018 |

Meeting Time and Location: MWF 12:00-12:50 pm room UCL 154

### Course Description: BIOL 426: An advanced course on hormone function, including anatomy, endocrine glands, endocrine systems and functions, homeostasis, neuroendocrinology, endocrine axes and cascades, hormones, receptors, 2nd messenger systems, hormone X gene interactions, interactions of hormones and the brain, and the evolution of endocrine systems. The course focuses on biological significance and mechanism of action of hormones involving the endocrine and nervous systems.

### Course Prerequisites: one of the following: BIOL 430 Neurobiology, BIOL 428 Comparative Physiology, BIOL 456 Mammalian Physiology, BIOC 430 Biochemistry, BIOL 426 Endocrinology - All prerequisites must have a grade of C or better

Description of Instructional Methods:

The course will consist of lectures and discussion on Neuroendocrinology and Endocrinology

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| **Date** | **Topic** | **Reading** |
| [*Acronyms*](http://www.usdbiology.com/cliff/ac.html) | *text:* **Vertebrate Endocrinology** *5th Edition* by **D.O. Norris & J.A. Carr** | [*Abbreviations*](http://www.usdbiology.com/cliff/ac.html) |
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| Aug 26 | [Hormones, Paracrines, Autocrines...](http://www.usdbiology.com/cliff/Courses/Endocrinology/1%20Hormones%20I.html) | 1-7, 30-45 |
| Aug 28-30 | [Glands & Target Tissue](http://www.usdbiology.com/cliff/Courses/Endocrinology/2%20Endocrine%20Glands%20II.html)[Receptors](http://www.usdbiology.com/cliff/Courses/Endocrinology/3%20Receptors%20III.html) | 7-1257-61 |
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| Sept 4 | [Endocrine Homeostasis](http://www.usdbiology.com/cliff/Courses/Endocrinology/4%20Homeostasis%20IV.html) | 13-20 |
| Sept 4 - 6 | [Second Messenger Systems:](http://www.usdbiology.com/cliff/Courses/Endocrinology/5%20Membrane%20R%202nd%20Messengers.html.html) cAMP | 61-72 |
| Sept 9 - 11 | [2nd Messengers:](http://www.usdbiology.com/cliff/Courses/Endocrinology/5%20Membrane%20R%202nd%20Messengers.html.html) Inositol Phosphate, JaK/STAT | 66-70 |
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| Sept 11 - 13 | [2nd Messengers:](http://www.usdbiology.com/cliff/Courses/Endocrinology/5%20Membrane%20R%202nd%20Messengers.html.html) Map K | 71-72 |
| Sept 13 | [Mechanisms of Hormone Action via Nuclear Receptors](http://www.usdbiology.com/cliff/Courses/Endocrinology/6%20Nuclear%20Receptors%20VI.html) | 86-93 |
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| Sept 16 | [Genetic Regulation](http://www.usdbiology.com/cliff/Courses/Endocrinology/7%20Gene%20Regulation%20VII.html) | 86-93 |
| Sept 16 | [Hormone Synthesis](http://www.usdbiology.com/cliff/Courses/Endocrinology/8%20Hormone%20Synthesis%20VIII.html) | 52-61 |
| Sept 18 | [Receptor Regulation](http://www.usdbiology.com/cliff/Courses/Endocrinology/9%20Receptor%20Regulation%20IX.html) | 68-70 |
| Sept 20 | [Hypothalamus](http://www.usdbiology.com/cliff/Courses/Endocrinology/10%20Hypothalamus%20Pituitary%20Communication%20X.html) | 119-124, 135-139203-210 |
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| Sept 23 | [Axes](http://www.usdbiology.com/cliff/Courses/Endocrinology/10%20Hypothalamus%20Pituitary%20Communication%20X.html) ***&*** [Adenohypophysis: Tropic Hormones](http://www.usdbiology.com/cliff/Courses/Endocrinology/11%20Tropic%20Hormones%20XI.html) | 107-119, 124-134 |
| Sept 25 | [Pars distalis: Tropic Hormones](http://www.usdbiology.com/cliff/Courses/Endocrinology/11%20Tropic%20Hormones%20XI.html) | 163-164, 187-203 |
| **Sept 27** | ***Exam #1*** |  |
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| Sept 30 | [Neurohypophysis: Vasopressin and Oxytocin](http://www.usdbiology.com/cliff/Courses/Endocrinology/12%20Neurohypophysial%20Nonapeptides%20XII.html) | 133-137 192-196 |
| Oct 2 | [Thyroid Axis](http://www.usdbiology.com/cliff/Courses/Endocrinology/13%20Thyroid%20Axis%20XIII.html) | 207-229 |
| Oct 4 | [Thyroid Hormones and Function](http://www.usdbiology.com/cliff/Courses/Endocrinology/13%20Thyroid%20Axis%20XIII.html) | 207-229 |
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| Oct 7 | [Steroid Biosynthesis](http://www.usdbiology.com/cliff/Courses/Endocrinology/14%20Steroids%20XIV.html) | 61-80 |
| Oct 9 | [Steroids:](http://www.usdbiology.com/cliff/Courses/Endocrinology/14%20Steroids%20XIV.html) Progestogens & Androgens | 61-80 |
| Oct 11 | [Steroids:](http://www.usdbiology.com/cliff/Courses/Endocrinology/14%20Steroids%20XIV.html) Estrogens | 61-80 |
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| Oct 16 | [Steroids:](http://www.usdbiology.com/cliff/Courses/Endocrinology/14%20Steroids%20XIV.html) Corticosteroids | 61-80 |
| *Oct 18* | [Adrenal Axis](http://www.usdbiology.com/cliff/Courses/Endocrinology/15%20HPA%20XV.html) | 261-273, 280-284, 291-299 |
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| *Oct 21* | [Adrenal Axis](http://www.usdbiology.com/cliff/Courses/Endocrinology/15%20HPA%20XV.html) | 261-273, 280-284, 291-299 |
| *Oct 23* | [Adrenal Axis](http://www.usdbiology.com/cliff/Courses/Endocrinology/15%20HPA%20XV.html) | 261-273, 280-284, 291-299 |
| *Oct 25* | [Adrenal Function: Chromaffin Tissue/Catecholamines](http://www.usdbiology.com/cliff/Courses/Endocrinology/16%20Catecholamines%20XVI%20XVII.html) | 283-287 |
| *Oct 25* | [Adrenal Function: Renin-Angiotensin-Aldosterone](http://www.usdbiology.com/cliff/Courses/Endocrinology/17%20Osmotic%20Pressure%20Balance%20XVIII.html) | 273-279 |
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| Oct 28 | [Gonadal Axis](http://www.usdbiology.com/cliff/Courses/Endocrinology/18%20HPG%20XIX.html) | 317-434 |
| Oct 30 | [Gonadal Axis](http://www.usdbiology.com/cliff/Courses/Endocrinology/18%20HPG%20XIX.html) | 317-370, 375-434 |
| **Nov 1** | ***Exam #2*** |  |
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| Nov 4 | [Endocrinology of Reproduction](http://www.usdbiology.com/cliff/Courses/Endocrinology/18%20HPG%20XIX.html) | 317-370, 375-434 |
| Nov 6 | [Prolactin and Growth Hormone Family: PrL](http://www.usdbiology.com/cliff/Courses/Endocrinology/19%20PrL%20XX%20XXI.html)[video](http://www.usdbiology.com/cliff/Courses/Endocrinology/Videos/PrL%20lecture%2018.MOV) | 112-115, 129-131, 175-176, 355-356 |
| Nov 8 | [Somatic Growth Axis](http://www.usdbiology.com/cliff/Courses/Endocrinology/20%20GH%20Somatic%20Axis%20XXII.html) [video](http://www.usdbiology.com/cliff/Courses/Endocrinology/Videos/GH%20lecture%2018.MOV) | 130-131 |
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| Nov 13 | [Growth Factors](http://www.usdbiology.com/cliff/Courses/Endocrinology/21%20Growth%20Factors%20XXIII.html) [video](http://www.usdbiology.com/cliff/Courses/Endocrinology/Videos/GF%20lecture%2018.MOV) | 143-145 |
| Nov 15 | [Hormones of the Immune System](http://www.usdbiology.com/cliff/Courses/Endocrinology/22%20Immune%20Factors%20XXIV.html) [video](http://www.usdbiology.com/cliff/Courses/Endocrinology/Videos/Immune%20lecture%2018.MOV) | 101-102 |
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| Nov 18 | [Calcium and Phosphate Homeostasis](http://www.usdbiology.com/cliff/Courses/Endocrinology/23%20Ca%20PO4%20XXV.html) [video](http://www.usdbiology.com/cliff/Courses/Endocrinology/Videos/Ca%20PO4%20lecture%2018.MOV) | 487-511 |
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| Nov 20 | [Pancreatic Hormones](http://www.usdbiology.com/cliff/Courses/Endocrinology/24%20Insulin%20Glucagon%20XXVI.html) | 453-461, 475-484 |
| Nov 22 | [Pancreatic Hormones](http://www.usdbiology.com/cliff/Courses/Endocrinology/24%20Insulin%20Glucagon%20XXVI.html) | 453-461, 475-484 |
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| **Nov 25** | ***Exam #3*** |  |
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| Dec 2 | [Feeding & Gastrointestinal Hormones](http://www.usdbiology.com/cliff/Courses/Endocrinology/25%20Gastrointestinal%20Hormones%20XXVII%20XXVIII.html); [Guts and Brains](http://www.usdbiology.com/cliff/Courses/Endocrinology/26%20Guts%20and%20Brains%20XXIX.html) + [Melatonin](http://www.usdbiology.com/cliff/Courses/Endocrinology/27%20Melatonin%20XXX.html) | 154-163, 213-218, 427-485 |
| Dec 4 | [Hormones from the Brain: Neurosteroids](http://www.usdbiology.com/cliff/Courses/Endocrinology/28%20Neurosteroids%20XXXI.html) & [Neuropeptides](http://www.usdbiology.com/cliff/Courses/Endocrinology/29%20Neuropeptides%20XXXII.html) | 3-12 |
| Dec 6 | [Evolution of Endocrine Systems](http://www.usdbiology.com/cliff/Courses/Endocrinology/30%20Endocrine%20Evolution%20XXXIII.html) | 20-27, 169-186 |
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| Dec 9 | [Evolution of Endocrine Systems](http://www.usdbiology.com/cliff/Courses/Endocrinology/30%20Endocrine%20Evolution%20XXXII.html) | 20-27, 169-186 |

Course Requirements: 3 exams + 1 drawing of a complete endocrine axis

Course Goals: To produce integrative knowledge of the neuroendocrine and endocrine anatomy, integrated endocrine physiology, receptor function, cell signaling, molecular biology, and a complete and integrated anatomy, ordinal hormonal axis cascades, intracellular second messenger cascades, cellular consequences, and feedback for an entire endocrine axis

Student Learning Outcomes: The students learn integrative endocrine physiology.

1. To integrate information from lectures on neuroendocrine systems, neurosecretory neurons, pituitary cells and tropic hormones, peripheral endocrine glands, cell signaling – receptors, 2nd messengers, nuclear receptor binding and DNA activation, appropriate DNA – promoters, transcription factors, and genes, and molecular mechanisms that promote changes in endocrine action, endocrine physiology and responses
2. To use that integrated information to produce a visual representation of an entire endocrine axis
3. To use that information to discuss specific matters of endocrine function, molecular function, and integrated physiology, and to answer exam questions on these topics

Evaluation Procedures: Each exam and drawing will be graded based on a rubric that includes detailed analysis of

1. Neuroendocrine neurons, capillary beds and blood supply, neurohormones, endocrine receptor systems, 2nd messengers, appropriate DNA – promoters, transcription factors, and genes, and molecular mechanisms that promote changes in tropic endocrine physiology and response
2. Pituitary trope cells, tropic hormone receptor systems, 2nd messengers, appropriate DNA – promoters, transcription factors, and genes, and molecular mechanisms that promote changes in hormone release, endocrine physiology, and glandular responses
3. Peripheral endocrine glands, hormones, receptor systems, 2nd messengers, appropriate DNA – promoters, transcription factors, and genes, and feedback systems changes in hormonal response, behavior, and endocrine physiology

Each exam and drawing is worth 100 points

The average of 3 exams plus 1 drawing is your final score: 90% or greater = A

 80 – 89% = B

 70 – 79% = C

 60 – 69% = D

 Below 60% = F

**Academic Integrity**

The College of Arts and Sciences considers plagiarism, cheating, and other forms of academic dishonesty inimical to the objectives of higher education. The College supports the imposition of penalties on students who engage in academic dishonesty, as defined in the “Conduct” section of the University of South Dakota Student Handbook.

No credit can be given for a dishonest assignment. A student found to have engaged in any form of academic dishonesty may, at the discretion of the instructor, be:

 a. Given a zero for that assignment.

 b. Allowed to rewrite and resubmit the assignment for credit.

 c. Assigned a reduced grade for the course.

 d. Dropped from the course.

 e. Failed in the course.

 **Freedom in Learning**

Under Board of Regents and University policy, student academic performance may be evaluated solely on an academic basis, not on opinions or conduct in matters unrelated to academic standards. Students should be free to take reasoned exception to the data or views offered in any course of study and to reserve judgment about matters of opinion, but they are responsible for learning the content of any course of study for which they are enrolled. Students who believe that an academic evaluation reflects prejudiced or capricious consideration of student opinions or conduct unrelated to academic standards should contact the dean of the college or school that offers the class to initiate a review of the evaluation.

**Disability Accommodation**

Any student who feels s/he may need academic accommodations or access accommodations based on the impact of a documented disability should contact and register with Disability Services during the first week of class or as soon as possible after the diagnosis of a disability. Disability Services is the official office to assist students through the process of disability verification and coordination of appropriate and reasonable accommodations. Students currently registered with Disability Services must obtain a new accommodation memo each semester.

Please note: if your home institution is not the University of South Dakota but one of the other South Dakota Board of Regents institutions (e.g., SDSU, SDSMT, BHSU, NSU, DSU), you should work with the disability services coordinator at your home institution.

Disability Services, The Commons Room 116

(605) 658-3745

Web Site: [www.usd.edu/ds](http://www.usd.edu/ds)

Email:  disabilityservices@usd.edu

**Accessibility Statement**

The University of South Dakota strives to ensure that physical resources, as well as information and communication technologies, are accessible to users in order to provide equal access to all. If you encounter any accessibility issues, you are encouraged to immediately contact the instructor of the course and the Office of Disability Services, which will work to resolve the issue as quickly as possible.

**Diversity and Inclusive Excellence**

The University of South Dakota strives to foster a globally inclusive learning environment where opportunities are provided for diversity to be recognized and respected. To learn more about USD’s diversity and inclusiveness initiatives, please visit the website for the Office of Diversity.