

This seminar style course for biology and E3B majors introduces students to the field of behavioral endocrinology. The structure of this course focuses on building student capacity in critical analysis and scientific writing through the subject of hormones and behavior to enable students to complete a scientific literature review on a topic in the field. By reading, analyzing, and reflecting on scientific literature every week, students practice critical reading skills specific to scientific writing, while honing writing and analytical abilities. Students combine the skills and knowledge learned over the semester to craft a relevant and personally engaging scientific question, as well as propose potential hypotheses, that serves as the subject of their literature review. Additional skills required to complete this paper are bolstered by weekly exercises in select topics (e.g. interpreting figures, claims assessment techniques, conducting a literature search, etc.). In addition, a weekly class discussion and opportunities for peer review promote student communication and collaboration.

### **UN3008 Animal Behavior and the Endocrine System**

Department of Ecology, Evolution, and Environmental Biology (E3B)  
Spring 2022

#### **Course Information**

Day & Time: MW 2:40-3:55pm

Location: Hamilton Hall Room 413

Format: Seminar

Credits: 3

Instructor: Stefanie Siller

Office: 90 Morningside Drive

Email: [ss4812@columbia.edu](mailto:ss4812@columbia.edu)

Office Hours: Wednesday 1pm

#### **Course Description**

Why do birds sing in the spring? How does a tadpole become a frog? In this course, we will dive into the mechanisms that drive the fascinating behaviors of animals. Students will first learn about hormones, chemical messengers within the body, and how they function within the endocrine system. Then, we will focus on the manner in which hormones both regulate and respond to specific types of animal behavior: mating and reproduction, aggression, stress, sociality, and parental care. Through these topics, students will engage with and learn to critically assess scientific literature. This course is reading and writing intensive; students will have weekly readings from the textbook and from theoretical and empirical scientific papers, and will write weekly reflection papers. Students will also contribute to a community of learning through discussion groups and peer review sessions. At the end of the semester, students will use the skills they have built throughout the course to investigate a question of their choosing, propose potential hypotheses, and complete a scientific literature review contributing to the field of behavioral endocrinology. Additional skills required to complete this paper are bolstered by weekly exercises in select topics (e.g. interpreting figures, claims assessment techniques, conducting a literature search, etc.). These exercises will also encourage students to think critically about the biases and implications for how science in this field is conducted.

## Prerequisites

An introductory biology course is strongly recommended. A basic understanding of genes and cellular mechanisms would be valuable. Refer to the following links for some useful background material to familiarize yourself with these topics before the course begins:

[Gene expression and regulation](#)

[Cell structure and function](#)

[Cell communication](#)

## Learning Objectives

The goal of this course is to invite students into the scientific discipline and build student capacity in critical analysis and scientific writing.

Students will gain the disciplinary knowledge to be able to:

- Define and classify the major amino acid-derived, peptide, and lipid-derived hormones, as well as their relationships to the major glands that compose the endocrine system
- Explain the basic principles and pathways through which these different categories of hormones interact with various animal behaviors, specifically: mating and reproduction, aggression, stress, sociality, and parental care

Students will gain transferable skills enabling them to:

- Identify the main question and arguments in a scientific article
- Decipher figures and determine the relevance of results using claims assessment techniques
- Write clearly, concisely, and critically in the manner and style of scientific writing
- Communicate and discuss ideas and questions collaboratively to contribute to a community of understanding

By the end of the course, students will combine their knowledge and skills to:

- Generate a research question and a hypothesis on a hormone and its associated behavior
- Conduct a literature review that surveys, synthesizes, and assesses the scientific literature to answer their research question

## Course Materials

- An Introduction to Behavioral Endocrinology 5<sup>th</sup> ed. (2016), by Randy J Nelson and Lance J Kriegsfeld
- Additional scientific articles, made available on the course page

## Course Policies

### Expectations

*Students can expect me* to be open and available for questions, help, and clarification on course contents and assignments; present material in a clear and concise manner; and provide meaningful feedback in a timely manner.

*I expect students to come to class prepared, focused, and engaged; be open to building new skills; be communicative with me about questions and concerns; and contribute to the class environment in a respectful and meaningful way.*

### Class Participation

Active participation in this course is important for cultivating a supportive, productive, and dynamic community of learning. In addition, students will build transferable skills in communication, collaboration, and reflection that will be important for future professional development. Participation will be made up of three parts: 1) engaging in class discussions by asking questions, proposing ideas, and responding to others; 2) actively listening in class discussion through note-taking and visually responding to others; and 3) handing in a “muddiest point” (a question or topic you would like more clarification on) at the end of each class.

### Attendance/Lateness

The success of this course depends on student attendance and active participation. Students are expected to be on time and attend every session. I will accept two unexcused tardies (over 10 minutes late) and one unexcused absence before your grade is impacted. If you have other classes or responsibilities that you anticipate may cause more frequent tardiness, speak with me as soon as the issue arises. If you anticipate missing more than one class session, present a plan to me on how you will make up missing work and maintain contribution to the class community.

### Email Policy

The best way to reach me is via email, at [ss4812@columbia.edu](mailto:ss4812@columbia.edu). Please allow 24 hours for me to respond to your email. If your email is in reference to the week’s reading or writing assignment, submit your email to me by **4pm the day before** the class session to ensure a timely response. Make your email subject as clear as possible so that the urgency and timeliness of your message is evident.

### **Academic Integrity**

Research and academic integrity are essential to the scientific disciplines. Integrity engenders trust, both between researchers, and between researchers and society. In order for science to be meaningful and impactful, it must adhere to ethical standards. Plagiarism is a serious issue and will not be tolerated. All work (both written and voiced in the discussion section) must be your own. In particular, you must use proper citations when referencing another’s work, and make sure that proper paraphrasing is used when necessary. We will review how to do this in class.

### **Accessibility and Inclusion**

This course is designed with the principles outlined in the [Center for Teaching and Learning’s Inclusive Teaching Guide](#) in mind. In particular, this course meets [Principle 3](#) by specifically selecting course content that recognizes the diversity of scientists that contribute to this field, placing underrepresented voices in the foreground. In addition, exercises throughout the course will encourage students to think critically about biases and implications in how science in this field is conducted; for instance, we will discuss how ideas about sex and gender have impacted research in male and female animal reproduction.

This course is designed to support students from various backgrounds as they build and hone critical skills. In accordance with [Principle 4](#), to design all course elements for accessibility, I will strive to make this course equitably accessible for all students. For instance, students will be given multiple avenues through which they can demonstrate their knowledge and skills, such as papers, exams, and oral presentations. Any students with disabilities should see me prior to the start of class to discuss how to best accommodate any special needs in order to optimize their experience in this course.

## **Class Sessions**

Each week will consist of two types of class sessions that together will serve to build student disciplinary knowledge and skills in order to meet the course's Learning Objectives. The first class section (Monday) will be an interactive lecture covering major concepts from the week's topic, led by the instructor. The second section (Wednesday) will be a group discussion concerning that week's reading and writing reflections, led by the students. Sections will also include exercises and activities to build particular scientific and critical thinking knowledge and skills. These weekly exercises will bolster student abilities in preparation for their final review paper (e.g. interpreting figures, claims assessment techniques, conducting a literature search, etc.).

## **Assignments & Exams**

### Reading and weekly writing reflections

It is *highly recommended* that readings from the textbook be completed before that week's Monday class session. All readings *must* be completed by the Wednesday class session.

Students will complete a one-page written reflection on that week's assigned article reading (*not* the textbook chapter reading), to be turned in at the start of that week's Wednesday class session. The reflection must include the author's main question and arguments, as well as a response to that week's prompt. In the latter half of the semester, students will also be asked to address how well they feel that the author's results support their conclusions, and propose additional questions or gaps that they see. These reflections will help students synthesize the readings, focusing on the main ideas, and learn to critically assess scientific writing. I will provide written feedback to students on their reflections. In addition, students will be able to practice using a rubric to give feedback on each other's reflections.

### Exams

There will be three, non-cumulative exams throughout the course. These exams will serve as a check-in on general knowledge and basic skill acquisition for both students and myself. Exams will be short answer questions, and will be given in the week's second section (Wednesday) unless noted otherwise.

### Review paper

By the end of the course, students will write a review paper based on a question of their choice and independent research. This project will consist of three parts:

1. Students will develop a question on a particular hormone/set of hormones and a specific behavior. They will present their question to the class in a short, 5-minute oral report. This report should include some background on the hormone and behavior of interest, address why the student finds this question interesting, and include at least two potential hypotheses that answer their question.

Students will be encouraged to incorporate feedback and answers to questions from their peers as a result of this report.

2. Students will create an outline for their final paper. This outline may be written, drawn as a diagram, or submitted in another form, so long as it clearly displays the connections between: your question, your hypotheses, the categories/subcategories of your paper, and your conclusions. This outline will be submitted for peer review, and graded by both peers and the instructor.
3. Students will compose a literature review paper (about 3000 words, or 6 pages) in the format of *Trends in Ecology & Evolution* (guidelines can be found [here](#) and will be fully explained in class). This review should present the student's question and hypotheses clearly, explain why the topic is important, synthesize (*not* summarize; synthesize means presenting an analysis of multiple texts to put forth a particular perspective or understanding) the relevant literature, and present knowledge gaps and avenues for future study. Students will have an opportunity to workshop a draft of their review paper with peers in class.

Students are *strongly encouraged* to meet with me often during this process to discuss their progress and get timely feedback. The [Writing Center](#) is also a great resource to utilize for this paper.

### Late assignments

Weekly written assignments must be handed in at the beginning of each class; *late assignments will not be accepted*. If a student anticipates missing a class session, or is unable to print their assignment before class, they can email their written assignment to me before the start of the class period to receive credit.

Due dates for each component of the review paper are indicated on the Course Outline (below). Any late assignments will be penalized by a **25% reduction** in grade for every day the assignment is late; assignments will not be accepted more than 48 hours past the due date. If you need more time for an assignment, please see me to discuss the circumstances and determine an appropriate extension deadline.

### **Feedback**

Feedback and revision is an important part of the scientific process. Students will have ample opportunity to both receive and give feedback throughout the course. We will have two in-class peer review sessions: one for the paper outline (which will be graded), and another for a draft of the final paper (which will not be graded). Students will also receive feedback on their weekly reflections, either from me or from a peer, and on their oral presentation.

Halfway through the semester, I will schedule a meeting with each student as an opportunity to check in on their learning experience. At this meeting, we will also check in regarding their final paper.

### **Grading**

Weekly writing reflections	15%
Participation	10%
Exams (3)	30% (10% each)
Review paper:	
Question/Hypothesis Oral Report	5%
Outline	10% (5% peer review, 5% instructor)
Final paper	30%

## Course Outline

Chapters refer to the Nelson and Kriegsfeld textbook. All articles will be available on the course page. Videos are suggested but optional.

Week	Dates	Theme	Readings Due	Assignments Due
1	1/19/22	Introduction to the Study of Behavioral Endocrinology	<i>None</i>	<i>None</i>
2	1/24/22 1/26/22	The (Neuro) Endocrine System	<p><u>Monday:</u> Chapter 1: The Study of Behavioral Endocrinology (pg 1-16) Chapter 2: The Endocrine System (pg 35-40, 76-82)</p> <p><u>Wednesday:</u> How to (seriously) read a scientific paper: <a href="https://www.sciencemag.org/careers/2016/03/how-seriously-read-scientific-paper">https://www.sciencemag.org/careers/2016/03/how-seriously-read-scientific-paper</a></p> <p><i>Suggested videos:</i> <a href="#">Intro to the endocrine system</a> <a href="#">Endocrine gland hormone review</a></p>	<i>None</i>
3	1/31/22 2/2/22	Hormonal Feedback Mechanisms	<p><u>Monday:</u> Chapter 2: The Endocrine System (pg 40-76)</p> <p><u>Wednesday:</u> Müller et al. (2003)</p>	<u>Wednesday:</u> Written reflection
4	2/7/22 2/9/22	Hormones in Development	<p><u>Monday:</u> Chapter 3: Sex Differences in Behavior: Sex Determination and Differentiation</p> <p><u>Wednesday:</u> <i>One of the following:</i> Tata (2006) Buccholz &amp; Hayes (2005)</p>	<u>Wednesday:</u> Written reflection
5	2/14/22 2/16/22	<b>Exam 1: Monday</b>	<u>Wednesday</u> McCarthy and Arnold (2011)	<i>None</i>
6	2/21/22 2/23/22	Hormones and Behavior: Female Reproduction	<p><u>Monday:</u> Chapter 6: Female Reproductive Behavior</p> <p><u>Wednesday:</u> CM Lind et al. (2020)</p>	<u>Wednesday:</u> Written reflection

7	2/28/22 3/2/22	Hormones and Behavior: Male Reproduction	<u>Monday:</u> Chapter 5: Male Reproductive Behavior  <u>Wednesday:</u> Neuman-Lee et al. (2017)	<u>Wednesday:</u> Written reflection
8	3/7/22 3/9/22	Hormones and Behavior: Parental Care	<u>Monday:</u> Chapter 7: Parental Behavior  <u>Wednesday:</u> <i>One of the following:</i> Bendesky et al. (2017) Marlin et al. (2015)	<u>Wednesday:</u> <b>Oral presentation</b>  Written reflection
9	3/14/22 3/16/22	<i>Spring Break</i>		
10	3/21/22 3/23/22	Hormones and Behavior: Aggression and Dominance	<u>Monday:</u> Wingfield et al. (1990)  <u>Wednesday:</u> <i>One of the following:</i> Ferree et al. (2004) Mehta & Josephs (2010) Tibbetts and Huang (2010)	<u>Wednesday:</u> Written reflection
11	3/28/22 3/30/22	<b>Exam 2: Monday</b>	<u>Wednesday:</u> Haines et al. (2020) Odom et al. (2013)	<i>None</i>
12	4/4/22 4/6/22	Hormones and Behavior: Stress	<u>Monday:</u> Chapter 11: Stress  <u>Wednesday:</u> Schmidt et al. (2013)	<u>Wednesday:</u> <b>Review paper outline</b>
13	4/11/22 4/13/22	Hormones and Behavior: Sociality	<u>Monday:</u> Chapter 8: Hormones and Social Behavior  <u>Wednesday:</u> Anacker & Beery (2013)	<u>Wednesday:</u> Written reflection
14	4/18/22 4/20/22	Evolution and Phenotypic Plasticity	<u>Monday</u> Dufty et al. (2002) Hau and Goymann (2015)	<u>Wednesday:</u> <b>Review paper draft</b>
15	4/25/22 4/27/22	Behavioral Endocrinology for Conservation	<u>Monday:</u> Cockrem (2005)  <u>Wednesday:</u> <i>One of the following:</i> Calisi & Bentley (2009) Elderbrock et al. (2021) Fusani et al. (2005)	<i>None</i>

16	5/2/22	<b>Exam 3: Monday</b>		<b>Review paper due: May 6</b>
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