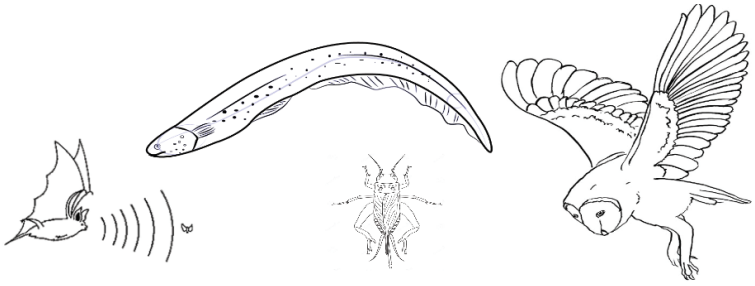
UC San Diego

PSYC/BIPN 189: Brains, Behavior, and Evolution



Welcome to the Course

Instructor: Julia Gorman

Email: jugorman@ucsd.edu

Time: Tuesdays and Thursdays from 2:00pm-4:50pm

Office hours: Wednesday 2pm-4pm or by appointment

Location: PODEM 1A22

Office: 3552 Mandler

TA: Christianna Royse (cdewind@ucsd.edu)
Office Hours: Tuesday 11am-12pm &Thursday 1pm-2pm in Mandler 3501

Course Description

How does the brain generate natural behavior? Over the past century, the fields of neuroscience, ethology, and psychology have increasingly converged around this central question. This course explores that question through the framework of neuroethology—a discipline that investigates how the nervous system has evolved to solve behaviorally relevant problems in natural environments.

In this course we will focus on examples of these behaviors such as birdsong**,** prey localization**,** electrosensation**,** and echolocation and examine how animals detect and interpret sensory signals, make decisions, coordinate movement, and adapt their behavior across time and context. Emphasis is placed on **ecologically grounded behavior**, on the **neural circuits and mechanisms** that support it, and on the **evolutionary forces** that have shaped those systems.

By taking this course, students will gain a working understanding of both general principles (sensory tuning, motor control, hormonal modulation) and specific solutions found in different taxa. Students will develop tools to critically evaluate how nervous systems produce behavior through the close reading of research, in-class discussion, and hands-on data interpretation.

This course aims not just to deliver knowledge, but to foster scientific thinking. You can expect to leave with a deeper understanding of the neural basis of behavior, improved skills in interpreting primary literature and technical writing**,** and confidence in your ability to engage in the ongoing conversation at the intersection of brains, behavior, and evolution.

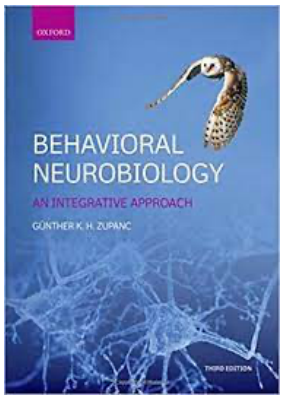
Course Learning Outcomes

Upon completion of this course, students will be able to:

- **Identify** and **explain** how evolutionary principles influence specific neural mechanisms and behaviors.
- **Compare** and **describe** examples of animal behavior and the neural circuits that underlie them.
- **Formulate** testable scientific questions about neural mechanisms of behavior and **evaluate** relevant peer-reviewed research.
- **Communicate** scientific ideas effectively through written assignments, class discussions, and presentations.

Textbook

Behavioral Neurobiology: An Integrative Approach, Zupanc (3rd edition)



By enrolling in this course, you have been automatically enrolled in the UC San Diego Inclusive Access program. This means that your required course materials are being provided to you automatically, and at a discounted price. A charge for this material ($33.50) will be added to your student account and will appear as "Course Materials Central Charge". You may opt out of this service.

Opt-out deadline: August 8, 2025
Opt-out Portal:*UC San Diego Inclusive Access Opt-Out Portal*

Once opted out you will be responsible for securing the text. A link to the opt-out portal has been sent to your UCSD email from noreply@follett.com
NOTE: Direct emails by publisher to purchase materials may be sent to student email. Please do NOT purchase through a publisher unless you opt out. *Please contact the bookstore if you have any difficulty using your materials or opting out: textbooks@ucsd.edu*

Assignments and Grading

Summary of Grade Criteria

Assignment	Weight	Due Date
Quizzes	5%	Every lecture
Midterm Exam	30%	August 21st in class
Topic Proposal	5%	August 14th, 11:59pm
Rough Draft	5%	August 26th, 11:59pm
Peer Review	5%	August 28th, 11:59pm
Research Paper	20%	Part 1: September 4th 11:59pm
Final Exam	30%	September 6th, 3pm-6pm
	100%	

Grading Scale

A = 93-100%	**A-** = 90-93%	
B+ = 87-89%	**B** = 83-86%	**B-** = 80-82%
C+ = 77-79%	**C** = 73-76%	**C-** = 70-72%
D+ = 67-69%	**D** = 63-66%	**D-** = 60-62%
F = 59%-below		

Grading Procedure and Feedback

Quizzes: Every class there will be two quizzes on paper, at the start of class and after the break. These quizzes are to serve two purposes: **attendance and a check-in on understanding.** The goal here is to serve as an idea of if you understand a concept from lecture or not. Quiz questions will reflect the difficulty of questions on the exams. There will be no make-up quizzes if a student misses a quiz.

Exams: There will be two exams that will be a mixture of short answer and multiple choice. The questions on the exams will align with the learning outcomes from lectures and reflect the difficulty from the quizzes. The final exam will cover material from the whole quarter.

Research Paper:

The topic is unrestricted, except that it must address the neural basis of a naturally occurring behavior of interest to you using only primary literature citations to support the factual statements in your paper. We will discuss the structure of the paper in detail in class. As a part of the writing process, you must submit a topic proposal and a draft manuscript for peer-review. Topic proposals are due by Aug 14th @ 11:59 PM. The draft of your paper, for peer review, is due on Aug 26th @ 11:59 PM. Peer reviews are due on Aug 28th @ 11:59 PM. The final draft is due Sep 4th @11:59pm. This will be a two-part paper where essay will be extended during the first 30 minutes of the final on September 6th. The goal is to give you space to reflect critically and originally on your topic and help you build deep knowledge through your own research and writing. When you turn in your draft, you will be assigned another student's draft to review. We will discuss details of the peer-review process in class. Briefly, it involves reading and providing constructive feedback on a classmate's manuscript according to the grading rubric. Reviews are submitted through Canvas https://guides.instructure.com/m/4212/l/54363-how-do-i-submit-a-peer-review-to-an-assignment

Late Policy

Assignments must be submitted on time to be eligible for full credit. Except in the case of documented medical or family emergencies, late assignments will be subjected to a 10% deduction per day if submitted within 72 hours after the posted due date. Assignments not submitted within 72 hours of the due date will receive a score of 0. There are no make-up midterms offered, except in the case of a documented medical or family emergency. If you for

some reason need an extension that is not covered by a documented medical or family emergency please meet with me in advance to discuss this possibility.

Course Schedule

Date	Class	Topic	Do	Learning Outcomes
Aug 05	1	Introduction + Animal Behavior and Evolution	• Read Zupanc Ch. 1,3 • Take pre-course quiz	• Define neuroethology • Explain evolution's role in shaping behavior
Aug 07	2	Neurons and Behavior	• Read Zupanc Ch. 2	• Describe the basic structure and function of neurons and their roles in transmitting information • Explain core methods used to investigate natural behaviors
Aug 12	3	Active orientation and localization	• Read Zupanc Ch. 5 • Read article for class	• Analyze sensory adaptations for orientation • Explain electrolocation based perception
Aug 14	4	Motor Control **+ Research Proposal Due by 11:59 PM**	• Read Zupanc Ch. 6	• Describe how simple neural circuits generate coordinated rhythmic movement • Explain how sensory input modulates motor output in escape responses • Identify the role of excitatory and inhibitory interneurons in patterned locomotion • Compare motor control strategies in vertebrate and invertebrate systems
Aug 19	5	Sensory Systems	• Read Zupanc Ch. 7	• Explain how sensory systems are tuned to recognize behaviorally relevant stimuli • Describe neural mechanisms underlying directional sound localization • Identify core principles of sensory coding in ecological contexts
Aug 21	6	Sensorimotor Integration **+ MIDTERM EXAM**	• Read Zupanc Ch. 8 • Read article for class	• Explain electric field sensing • Relate environment to sensory evolution
Aug 26	7	Motivation and Neuromodulation **+ Research Paper Draft Due by 11:59 PM**	• Read Zupanc Ch. 9	• Explain how neuromodulators enable behavioral flexibility through biochemical switching • Describe mechanisms of structural plasticity that reorganize neural circuits • Evaluate how internal states modulate behavior by altering neural responsiveness
Aug 28	8	Biological Clocks **+ Peer Review Due by 5:00 PM**	• Read Zupanc Ch. 10	• Describe the neural and molecular mechanisms underlying circadian rhythms • Explain how internal biological clocks synchronize behavior with environmental cycles
Sep 02	9	Communication	• Read Zupanc Ch. 12 • Read article for class	• Outline song system pathways • Compare vocal communication across species
Sep 04	10	Learning and Memory **+ Final Draft Due by 11:59 PM**	• Read Zupanc Ch. 13 • Take post course quiz	• Describe memory formation • Connect neural plasticity to behavior • Evaluate behavioral plasticity
Sep 06	-	**FINAL EXAM 3:00 – 6:00 PM**		

Overall Community and Engagement Expectations

What you can do to support your success in the course:	What I will do to support your success in the course:
Read the syllabus and stay current with course information	Be prepared and bring my enthusiasm for teaching to each session
Keep up with readings and assignments, as each one builds on the previous one.	Respond to emails within one working day, and provide timely feedback on assignments / submissions.
Contribute to the learning environment with fairness, cooperation, and professionalism	Establish a learning environment with fairness, cooperation and professionalism, and will take action if these principles are violated.
Treat your classmates, instructional assistants and myself honestly and ethically	Treat you honestly and ethically, and will address any concerns you might have
Commit to excel with integrity[1]. Have the courage to act in ways that are honest, fair, responsible, respectful & trustworthy.	Uphold integrity standards and create an atmosphere that fosters active learning, creativity, critical thinking, and honest collaboration.
Manage your time, so you can stay on track with the course and complete tasks on time	Only assign work that is vital to the course, and will work to meet the standard credit hour allotment for the course.
Communicate with me if you determine that a deadline cannot be met due to extenuating circumstances	Consider requests for adjustments and will make reasonable exceptions available to all students when approved

Inclusion Statement

It is my goal to create a learning environment that supports diversity of thought, perspective, experience, and identities. I encourage all of you to participate in discussion and contribute to the field from your perspective. If you have feedback on how to make the class more inclusive, please get in touch!

Office of Equity, Diversity, and Inclusion:
858.822.3542 | diversity@ucsd.edu | https://diversity.ucsd.edu/
https://students.ucsd.edu/student-life/diversity/index.html
https://regents.universityofcalifornia.edu/governance/policies/4400.html

Campus and Course Policies

Health and Well-Being Statement

Your health and well-being are central to your success in this course and at UC San Diego. If you are experiencing challenges related to physical or mental health, academic stress, family responsibilities, or other personal concerns, I encourage you to reach out for support and for any adjustments you may need. If you need to miss class, request an extension, or adjust how you engage with the course, please let me know. I am committed to working with you in good faith to support your learning and well-being. UC San Diego offers a range of free and confidential resources to support students, including:

- **Counseling and Psychological Services (CAPS)**
  https://caps.ucsd.edu | (858) 534-3755
  Individual counseling, group workshops, and urgent care
- **Triton CORE**
  Peer support, crisis response, and wellness events across campus
- **Basic Needs Hub**
  https://basicneeds.ucsd.edu
  Food, housing, and financial wellness resources
- **Student Health Services**
  https://studenthealth.ucsd.edu

Subject to Change Policy

The information contained in the course syllabus, other than the grade and absence policies, may be under certain circumstances (e.g. to enhance student learning) subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Technology Policy

Please do not use cell-phones during class. Students are welcome to bring laptops to lecture for note-taking purposes. Please see this research study that shows “multi-tasking” on computers is likely to decrease your grade, but it also decreases the grades of people around you who can see your screen! For this reason, I ask that you do not flip between lectures notes and the internet. Use of a cell phone or other similar electronic devices during an exam is grounds for receiving a failing grade.
http://www.sciencedirect.com/science/article/pii/S0360131512002254

Academic Integrity

The Policy on Integrity of Scholarship aims to encourage and maintain the highest ethical standards in research. The policy reaffirms the University’s commitment to integrity:
Integrity is essential for an academic community. The University expects that both faculty and

students will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind.
(http://senate.ucsd.edu/manual/appendices/appendix2.pdf)

AI Policy

The use of GenAI or any other AI tool to help you in understanding this course is permissible. However, the purpose of writing a research paper is to get you to think and understand what you mean, not to just produce writing. All written assignments that use GenAI or AI of any sort will be considered plagiarism and will be scored a 0 per the UCSD Academic Integrity Policy. You must be the sole author of your paper.

UCSD Disability Access

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged. You may also contact the OSD directly: 858.534.4382 or osd@ucsd.edu.

Campus Policies

It is expected that this course and all students in the course adhere to these campus polices.

- **UC San Diego Principles of Community**
- **UC San Diego Policy on Integrity of Scholarship**
- **Religious Accommodation**
- **Nondiscrimination and Harassment**
- **UC San Diego Student Conduct Code**