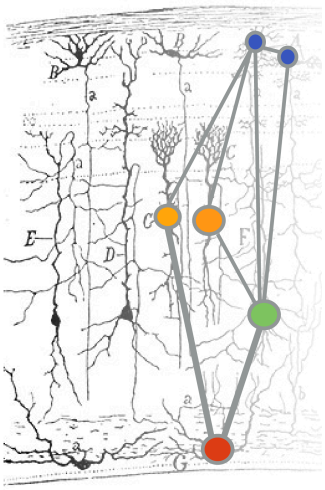

BIPN 145 Neurobiology Laboratory

Spring 2024

Instructor Isabella Maita

Student hours Mondays, 12 PM
Bcb Cafe, Outside York Hall
(or by appointment)

Instructional Assistant Samantha Mak
Office Hours: by appointment
Contact: s3mak@ucsd.edu

Staff Research Associate Haley Stott

Lecture: MWF 11-11:50 AM in Podemos 133
Lab: WF 12:30 - 3:50 PM in York 1310
Course website: https://sites.google.com/ucsd.edu/bipn145

Course learning objectives:

1. **Collect** and **evaluate** neural data from various organisms
2. **Apply** principles of neural communication to multiple model systems
3. **Describe** the breadth of techniques in neuroscience and the experimental questions they are suited to answer
4. **Develop** an appreciation for and practical insight into the process of research
5. **Communicate** research to peers as well as a broader audience

Attendance Policies

You are expected to attend our in-person lab sessions, but lecture attendance is *not* mandatory. However, as you soon will see, even our lecture sessions will not be unidirectional — these will be active learning sessions where we co-create our learning. These lecture sessions will be podcasted/recorded, but you will be expected to make up any in-class activities that you missed.

If you cannot attend a lab session due to a positive COVID-19 test, exposure, or for any other reason, **please contact both Prof M and your IA ASAP so that we can work with you on accommodations.**

Enrolled and waitlisted students must attend the first lab session. Additional details: http://biology.ucsd.edu/go/ug-labs. You do not need to inform us if you will be missing a lecture session.

Updated Sep 25, 2023

Additional resources

There is a list of resources listed here to help you thrive this quarter. If there is anything you think we can help you out with, please feel free to reach out to the IAs or Prof M

Grading

QUIZZES & ASSIGNMENTS (380 pts, *20-45 pts each*) Includes quizzes/results for individual lab activities and pre-lab quizzes.

MIDTERMS *(200, 100 pts each)*

PROFESSIONALISM *(25 pts)*

EARTHWORM REPORT (*150 pts)*
Your first lab report will summarize our earthworm experiments. This grade includes a draft and your review of two other drafts.

FINAL PROJECT *(145 pts)*
Project proposal, presentation.
FINAL LAB REPORT- Optional *(100 pts, final grade will be out of 1000)* Written lab report.

Late Assignments

- For **individual assignments only,** you have a 3 day late bank that you may use over the course of the quarter to extend your deadlines without penalty.
- You can request a late bank **before the deadline** by filling out this Late Bank Form.
- Assignments not protected by the late bank will lose -10% for each day they are late.
- In the case of extenuating circumstances requiring a submission more than three days late, please contact Prof M directly.

Additional notes on grading

- Final scores will be converted to letter grades, where A=90-100%, B=80-89.99%,C=70-79.99%, D=60-69.99%, and F=0-59.99%. For positive and minus grades, A+ = 97-100, A = 93-96.99, A- = 90-92.99, B+ = 87-89.99, B = 83-86.99, B- = 80-82.99, and so on.
- Final scores are as you see them on Canvas, once all of your assignments are graded. There is no rounding up to the closest score.

Please note that add/drop deadlines are different for lab courses than lecture courses. Students who drop a Biology lab class after the end of the second class meeting will be assigned a "W". Additional details: http://biology.ucsd.edu/go/ug-labs.

Course Philosophy

A note on our course's environment

We'll be working together to create an equitable and inclusive environment of mutual respect, in which we all feel comfortable to share our moments of confusion, ask questions, and challenge our understanding. Everyone should be able to succeed in this course. If you do not feel that is the case please let me know.

To help accomplish this:

- I'll ask for your preferred name & pronouns on our incoming survey. If these change over the course of the quarter, please let me know.
- Please don't hesitate to come and talk with me if you feel like your performance in the class is being impacted by your experiences outside of class.
- I am constantly learning about diverse perspectives and identities. If something was said in class (by anyone) that made you feel uncomfortable, please talk to me about it.
- As a participant, you should also strive to honor the diversity of your classmates.

On the equity & diversity of our course content

Despite the way we typically conceive of the scientific process, much of science is *subjective* and is historically built on a small subset of privileged voices. In this class, we will make an effort to show the work of diverse scientists, but limits still exist on this diversity. I acknowledge that it is possible that there may be both overt and covert biases in the material due to the lens with which it was written, even though the material is primarily of a scientific nature. Integrating a diverse set of experiences is important for a more comprehensive understanding of science. To this end, we will discuss diversity in neuroscience as part of the course from time to time.

Course accommodations

If you need accommodations for this course due to a disability, please contact the Office for Students with Disabilities (osd@ucsd.edu) for an Authorization for Accommodation letter. Please speak with me in the first week of class if you intend to apply for accommodations. For more information, visit http://disabilities.ucsd.edu.

This course, and the work it entails, is for *you*

You won't benefit if others (or a generative AI) do your work. Cases of academic dishonesty or cheating will be first handled by me, and then by the Academic Integrity Office. If you become aware of cheating in this class, you can anonymously report it: https://academicintegrity.ucsd.edu/

Turnitin

Students agree that by taking this course all required papers will be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

Lab safety is important

Enrolled and waitlisted students must successfully complete the Biology Lab Safety Training and Assessment before the first lab session: https://biolabclass-safetyquiz.ucsd.edu/introduction. **You will *not* be allowed into the lab for the second in-person lab session unless you have successfully passed the safety assessment.** Note that you **do not need to bring your own personal protective equipment** (e.g. a lab coat or goggles) for this course. We will provide gloves when needed.

Course management & texts

Lab Manual

You can purchase the BIPN 145 lab manual in the bookstore by searching for our course. Previous versions of the manual are fine.

Canvas

This course will be using Canvas to manage content and grades. You can log in by going to http://canvas.ucsd.edu. It's recommended that you **avoid Safari** for Canvas quizzes and exams (Firefox or Chrome works great). If you need any technical assistance with Canvas, please alert your instructor and send an email to servicedesk@ucsd.edu.

DataHub

We'll be using the UCSD DataHub for coding exercises and to run analysis code. Check your login at http://datahub.ucsd.edu.

Textbook

There is no mandated textbook for this course, but most of the background material can be found in Purves et al. (2018) *Neuroscience*. We'll also use Carter & Shieh (2015) *Guide to Research Techniques in Neuroscience*, which can be found online here (link is also under *Resources* on Canvas). In addition, for each module I have curated resources that will be useful to you. You can find these on Canvas, or on the course website.

Software for this class

It will be helpful to have the following software on your computer, since you'll often need to rely on a personal computer. If you have any issues with these or would prefer not to download anything

onto your personal computer, you are welcome to rely on a teammate or reach out to us for additional accommodations. If you need a laptop for the quarter, you can request a loaner laptop by filling out this form: https://eforms.ucsd.edu/view.php?id=490887.

Microsoft Office

It may be useful to have Microsoft Office in this course. You can find it here.

LabChart Reader

If you can, please download LabChart Reader on your personal computer. We'll be using this to analyze previously collected data.

Course schedule

SUBJECT TO CHANGE — **You can find readings & due dates for assignments on Canvas.**

Date		Location	Topic	Due/Reading
Week 1				
Apr 1	Lecture	PODEM 133	An introduction to BIPN 145 & nervous systems	Take the Welcome Survey
Apr 3	Lecture	PODEM 133	The passive neural membrane	
	Lab	York 1310	Neuromembrane (Note: This experiment is not in your lab manual! It is linked on Canvas.)	Take the online safety test https://biolabclass-safetyquiz.ucsd.edu/
Apr 5	Lecture	PODEM 133	Modeling neural activity Coding in BIPN 145	**DUE** Neuromembrane Quiz
	Lab	York 1310	**Experiment #1**: RC Circuits	
Week 2				
Apr 8	Lecture	PODEM 133	The action potential	**READ** Hodgkin & Huxley (1939) **DUE** RC Circuit Quiz
Apr 10	Lecture	PODEM 133	Recording from the nervous system; Earthworm nervous systems	
	Lab	York 1310	Exporting & importing data from LabChart **Experiment #2:** String Lab	
Apr 12	Lecture	PODEM 133	Writing lab reports Two-sample statistics	**DUE** Earthworm Pre-Lab Quiz
	Lab	York 1310	**Experiment #3:** Earthworm Experiments	
Week 3				

Apr 15	Lecture	PODEM 133	The speed of the nervous system	**DUE** String Lab (Group)
Apr 17	Lecture	PODEM 133	Intracellular & patch clamp recording	
	Lab	York 1310	**Experiment #3:** Earthworm Experiments/Analysis	
Apr 19	Lecture	PODEM 133	Wrapping up "speed of the nervous system" + "Fake neuron"	**DUE** Leech Pre-Lab Quiz
	Lab	York 1310	**Experiment #4:** Intracellular Equipment	**SUNDAY NIGHT** Earthworm Draft

Week 4

Apr 22 (drop deadline)	Lecture	PODEM 133	Earthworm Draft Feedback	
Apr 24	Lecture	PODEM 133	Leech Physiology & Cell Types	
	Lab	York 1310	**Experiment #4:** Recording from the Retzius Cell of the Leech	
Apr 26	Lecture	PODEM 133	Leech Lab Reports **Review for the exam**	**DUE** Earthworm Draft Feedback
	Lab	York 1310	**Experiment #4**: Filling a cell in the leech	

Week 5

Apr 29	**Exam #1**	PODEM 133	**Exam #1** ***Note:*** *Student hours Mon., 12 PM*	
May 1	Lecture	PODEM 133	Motor circuits & EMG	
	Lab	York 1310	Analysis & Catch Up Day	

May 3	Lecture	PODEM 133	Neurotransmission **Introduction to final projects**	**DUE** Leech Results (Group)
	Lab	York 1310	**Experiment #5:** EMG lab	**SUNDAY DUE** Earthworm Lab

Week 6

May 6 (deadline to drop w/ "W")	Lecture	PODEM 133	Ethology & behavior	**DUE** EMG Quiz
May 8	Lecture	PODEM 133	Drosophila behavior **In-Class Assignment**	**READ** your Drosophila behavior handout
	Lab	York 1310	**Experiment #7:** The Case of the Mislabeled Vials	
May 10	Lecture	PODEM 133	Drosophila genetics & optogenetics	
	Lab	York 1310	**Experiment #7:** The Case of the Missing Methods **In-Lab Assignment**	**DUE BEFORE LAB @ 10 AM** Drosophila Methods

Week 7

May 13	Lecture	PODEM 133	Electroencephalography (EEG)	
May 15	Lecture	PODEM 133	EEG and Signal Processing	**DUE THURSDAY @ 11:59 pm:** Drosophila Presentation slides
	Lab	York 1310	**Experiment #8: EEG**	
May 17	Lecture	PODEM 133	Drosophila Presentations	
		York 1310	**Experiment #8: EEG** (Analysis) Project proposal preparation time	**DUE SUNDAY @ 11:59 pm:** Project proposals

Week 8

May 20	Lecture	PODEM 133	Visualizing the nervous system	**DUE** EEG Quiz & Results
May 22	Lecture	PODEM 133	Mapping neural circuits	**Submit** Final Project Equipment & Needs [Spreadsheet]
	Lab	York 1310	Mouse brain connectivity	
May 24	Lecture	PODEM 133	21st century neuroscience techniques	**DUE** Mouse brain connectivity
	Lab	York 1310	Allen Brain Observatory (2p data)	

Week 9

May 27			*No Class: Memorial Day Holiday*	
May 29	Lecture	PODEM 133	Careers in neuroscience **Review for Exam #2**	**DUE** Allen Brain Observatory
	Lab	York 1310	**Work on final projects**	
May 31	Lecture	PODEM 133	**Exam #2** ***Note:*** *Student hours Mon., 12 PM*	
		York 1310	**Work on final projects**	

Week 10

Jun 3	*No lecture*		Project consultations (on Zoom) *(sign up for Mon or Wed)*	
Jun 5	Lecture	PODEM 133	Project consultations Sam's Research presentation	
	Lab	York 1310	**Work on final projects**	
Jun 7	Lecture	PODEM 133	Final project presentations	
	Lab	York	Final project presentations	

1310	

DUE JUN 10th @ 11:59 pm:
Final project lab reports