



BIPN 145 Neurobiology Laboratory

Winter 2024

Instructor

Ashley Juavinett

Instructional Assistant

Hyeonseok Jang

Office hours

Mondays at 12 pm
@ Mandeville Coffee Cart
(or by appointment)

Staff Research Associate

Haley Stott

Lecture: MWF 11-11:50 AM in Mandeville B-104

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 Dr. J and IAs 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.

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 Dr. J.

Grading

QUIZZES & ASSIGNMENTS (375 pts, 20-50 pts each) Includes quizzes for individual lab activities and pre-lab quizzes.

FINAL PROJECT (250 pts)
Project proposal, presentation, and written report.

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.

MIDTERMS (200, 100 pts each)

PROFESSIONALISM (25 pts)

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 form: <https://forms.gle/SAeRJKyCWRtdhbFx7>.
- 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 Dr. J 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

So, 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/>

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				
Jan 8	Lecture	MANDE B-104	An introduction to BIPN 145 & nervous systems	Take the incoming survey (link on Canvas)
Jan 10	Lecture	MANDE B-104	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/
Jan 12	Lecture	MANDE B-104	Modeling neural activity Coding in BIPN 145	DUE Neuromembrane Quiz
	Lab	York 1310	Experiment #1: RC Circuits	
Week 2				
Jan 15			No lecture – MLK Day	DUE RC Circuit Quiz
Jan 17	Lecture	MANDE B-104	The action potential	READ Hodgkin & Huxley (1939)
	Lab	York 1310	Recording from the nervous system; Exporting & importing data from LabChart Experiment #2: String Lab	
Jan 19	Lecture	MANDE B-104	Earthworm nervous systems	DUE Earthworm Pre-Lab Quiz
	Lab	MANDE B-104	Experiment #3: Earthworm Experiments	
Week 3				
Jan 22	Lecture	MANDE B-104	Writing lab reports	DUE String Lab

Jan 24	Lecture	MANDE B-104	The speed of the nervous system Two-sample statistics	
	Lab	York 1310	Experiment #3: Earthworm Experiments/Analysis	

Jan 26	Lecture	MANDE B-104	Intracellular & patch clamp recording	DUE Leech Pre-Lab Quiz
	Lab	MANDE B-104	Experiment #4: Intracellular Equipment	SUNDAY NIGHT Earthworm Draft

Week 4

Jan 29	Lecture	MANDE B-104	Earthworm Draft Feedback Time	
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Jan 31	Lecture	MANDE B-104	Leech Physiology & Cell Types	
	Lab	York 1310	Experiment #4: Recording from the Retzius Cell of the Leech	

Feb 2 (drop deadline)	Lecture	MANDE B-104	Review for the exam	DUE Earthworm Draft Feedback
	Lab	York 1310	Experiment #4: Filling a cell in the leech	

Week 5

Feb 5	No Lecture	MANDE B-104	Exam #1	
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Feb 7	Lecture	MANDE B-104	Motor circuits & EMG	DUE Leech Lab (Group)
	Lab	York 1310	Analysis & Catch Up Day	

Feb 9	Lecture	MANDE B-104	Introduction to final projects	SUNDAY DUE Earthworm Lab
	Lab	York 1310	Experiment #5: EMG lab	

Week 6

Feb 12	Lecture	MANDE B-104	Ethology & behavior	DUE EMG Quiz
Feb 14	Lecture	MANDE B-104	Drosophila behavior In-Class Assignment	READ your Drosophila behavior handout
	Lab	York 1310	Experiment #7: The Case of the Mislabeled Vials	
Feb 16 (deadline to drop w/ "W")	Lecture	MANDE B-104	Drosophila genetics & optogenetics	
	Lab	York 1310	Experiment #7: The Case of the Missing Methods In-Lab Assignment	DUE BEFORE LAB Drosophila Methods

Week 7

Feb 19			<i>No lecture – President's Day</i>	WATCH Re-engineering the brain
Feb 21	Lecture	MANDE B-104	Electroencephalography (EEG)	DUE THURSDAY @ 11:59 pm: Drosophila Presentation slides
	Lab	York 1310	Experiment #8: EEG	
Feb 23	Lecture	MANDE B-104	Drosophila Presentations	
		York 1310	Experiment #8: EEG (Analysis) Project proposal preparation time	DUE SUNDAY @ 11:59 pm: Project proposals

Week 8

Feb 26	Lecture	MANDE B-104	Visualizing the nervous system	DUE EEG Report (<i>Group</i>)
Feb 28	Lecture	MANDE B-104	Mapping neural circuits	Submit Final Project Equipment & Needs Survey

	Lab	MANDE B-104	Mouse brain connectivity	
Mar 1	Lecture	MANDE B-104	Two-photon imaging	DUE Mouse brain connectivity
	Lab	MANDE B-104	Allen Brain Observatory (2p data)	

Week 9

Mar 4	Lecture	MANDE B-104	Review for Exam #2	DUE Allen Brain Observatory
Mar 6	Lecture	MANDE B-104	Exam #2	
	Lab	York 1310	Work on final projects	
Mar 8	Lecture	MANDE B-104	Careers in neuroscience	
		York 1310	Work on final projects	

Week 10

Mar 11	No lecture		Project consultations (sign up for Mon or Wed)	
Mar 13	No lecture	MANDE B-104	Project consultations	
	Lab	York 1310	Work on final projects	
Mar 15	Lecture	MANDE B-104	Final project presentations	
	Lab	York 1310	Final project presentations	

DUE MAR 18th @ 11:59 pm:
Final project lab reports