BIPN 145 Neurobiology Laboratory
Winter 2023

Instructor
Ashley Juavinett

Office hours
Fridays @ 10 am
⊙ Art of Espresso
(or by appointment)

Instructional Assistants
Kaili Inouye
Ahmed Abushawish

Staff Research Associate
Haley Stott

Lecture: MWF 11-11:50 AM in HSS 1128A
Lab: WF 12:30 - 3:50 PM in York 1310

Course website: https://sites.google.com/ucsd.edu/bipn145

Course learning objectives:

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

Notes on our how class will run during a global pandemic

I realize that it is tough to stay engaged and motivated during year *three* of a global pandemic. I also realize many of you are eager to get back to "normal" life at UC San Diego and beyond. We're going to do what we can in this class to productively learn what we can together in person, while maintaining a safe and flexible environment. I appreciate your patience as we work together to figure out how to live and learn in these rather unreasonable times.

You are encouraged to wear a mask in both lecture & lab. Further, please **test regularly** and be **mindful of any viral symptoms**. **If you feel sick and have symptoms consistent with COVID-19 or another respiratory virus: stay home, contact your IA and instructor, and get tested.** Please see the Exposure & Contact Tracing page on the UC San Diego website for more information.

Attendance Policies

If you feel well and have *not* knowingly been exposed to COVID-19, **you are expected to attend our in-person lab sessions**. I personally believe that there is a benefit to conducting our

experiments in-person as well as being in lecture together. 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 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 <u>must</u> attend the first lab session (on Wednesday, January 11th). 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

Laboratory reports *(250 pts, 75-100 pts each)*
Data collected as a group, **written individually**

Final group project *(225 pts)*
Project proposal, presentation, and written report

Assignments *(300 pts, 20-50 pts each)*
Includes smaller lab write-ups, pre-lab quizzes, and in-class assignments

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, like others, am in the process of 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 in course discussions, you should also strive to honor the diversity of your classmates.

On the equity & diversity of our course content

In an ideal world, science would be objective. However, 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 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 <u>before</u> the first lab session: https://biolabclass-safetyquiz.ucsd.edu/introduction. Please note that courses offered by other departments (Chemistry, for example) may have additional safety training requirements. If you arrive at the <u>first</u> lab session having not passed the safety assessment, you'll only be able to observe the lab. **You will *not* be allowed into the lab for the second in-person lab session unless you have successfully passed the safety assessment**.

Course management & texts

Lab Manual

BIPN 145 has a lab manual! You can purchase it in the bookstore by searching for our course.

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 9	Lecture	HSS 1128A	An introduction to BIPN 145 & nervous systems	Take the incoming survey
Jan 11	Lecture	HSS 1128A	The passive neural membrane & modeling neural activity	Online safety test
	Lab	York 1310	Neuromembrane (Note: This experiment is not in your lab manual! It can be found here.)	
Jan 13	Lecture	HSS 1128A	Coding & statistics for biologists	**DUE @ 5 pm**: Neuromembrane Quiz
		York 1310	**Experiment #1**: RC Circuits	
Week 2				
Jan 16	*No lecture*		*Martin Luther King Jr. Holiday*	**DUE @ 5 pm**: RC Circuit Quiz
Jan 18	Lecture	HSS 1128A	The action potential	**READ** Hodgkin & Huxley (1939)
	Lab	York 1310	*Before lab*: Recording from the nervous system	
			Experiment #2: String Lab	

| Jan 20 | Lecture | HSS 1128A | Earthworm nervous systems & lab report | **DUE @ 5 pm**: String Data |
| | Lab | HSS 1128A | **Experiment #3:** Earthworm Experiments | **READ** Earthworm Protocol & **Complete Earthworm Pre-Lab Quiz** |

Week 3

Jan 23	Lecture	HSS 1128A	Writing lab reports	
Jan 25	Lecture	HSS 1128A	The speed of the nervous system	
	Lab	York 1310	**Experiment #3:** Earthworm Experiments/Analysis	
Jan 27	Lecture	HSS 1128A	Intracellular & patch clamp recording	
	Lab	HSS 1128A	**Experiment #4:** Intracellular Equipment	**READ** Experiment #4 Protocol & **Complete Leech Pre-Lab Quiz**

Week 4

Jan 30	Lecture	HSS 1128A	Leech Physiology & Cell Types	**DUE @11:59 pm:** Earthworm Lab Report
Feb 1	Lecture	HSS 1128A	Coding in neuroscience **In-Class Assignment**	
	Lab	York 1310	**Experiment #4:** Recording from the Retzius Cell of the Leech	
Feb 3 ([drop deadline](#))	Lecture	HSS 1128A	Leech lab report details **Review for the midterm**	
	Lab	York 1310	**Experiment #4**: Filling a cell in the leech	

Week 5

Feb 6	*No Lecture*	HSS 1128A	**Midterm #1**	
Feb 8	Lecture	HSS 1128A	Motor circuits & EMG	
	Lab	York 1310	Analysis & Catch Up Day	
Feb 10	Lecture	HSS 1128A	**Introduction to final projects**	
	Lab	York 1310	**Experiment #5:** EMG lab	**DUE SUNDAY @ 11:59 pm**: Leech Lab Report

Week 6

Feb 13	Lecture	HSS 1128A	Ethology & behavior	**DUE @ 5 pm**: EMG Quiz
Feb 15	Lecture	HSS 1128A	Drosophila behavior **In-Class Assignment**	**READ** your [Drosophila behavior handout](#)
	Lab	York 1310	**Experiment #7:** The Case of the Mislabeled Vials	
Feb 17 ([deadline to drop w/ "W"](#))	Lecture	HSS 1128A	Drosophila genetics & optogenetics	**WATCH** Re-engineering the brain
	Lab	York 1310	**Experiment #7:** The Case of the Missing Methods	

Week 7

Feb 20	*No Lecture*		*Presidents' Day Holiday*	
Feb 22	Lecture	HSS 1128A	Electroencephalography (EEG)	**DUE TUESDAY @ 11:59 pm:** Drosophila Presentation slides
	Lab	York 1310	**Experiment #8: EEG**	
Feb 24	Lecture	HSS 1128A	Drosophila Presentations	**DUE @ 11:59 pm:** Project proposals
	Lab	York 1310	**Experiment #8: EEG**	**DUE @ 11:59 pm:**

| | | | Drosophila Methods | |

Week 8

Feb 27	Lecture	HSS 1128A	Visualizing the nervous system	**Submit** Final Project Equipment & Needs Survey
Mar 1	Lecture	HSS 1128A	Mapping neural circuits	
	Lab	York 1310	Mouse brain connectivity	
Mar 3	Lecture	HSS 1128A	Two-photon imaging	**DUE @ 5 pm:** Mouse brain connectivity
	Lab	York 1310	Allen Brain Observatory (2p data)	

Week 9

Mar 6	*No Lecture*	HSS 1128A	**Review for Midterm #2**	**DUE MONDAY @ 11:59 pm**: EEG Lab Report
Mar 8	Lecture	HSS 1128A	**Midterm #2**	**DUE @ 5 pm:** Allen Brain Observatory
	Lab	York 1310	**Work on final projects**	
Mar 10	Lecture	HSS 1128A	Expectations for final project presentations & project planning period	
	Lab	York 1310	**Work on final projects**	

Week 10

Mar 13	Lecture	HSS 1128A	Careers in neuroscience	
Mar 15	Lecture	HSS 1128A	**TA Lecture**	
	Lab	York 1310	**Work on final projects**	
Mar 17	Lecture	HSS 1128A	Final project presentations	

Lab	York 1310	Final project presentations

DUE MARCH 22 @ 11:59 pm:
Final project lab reports