



BIPN 145 Neurobiology Laboratory

Spring 2020

Instructor

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Instructional Assistants

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(Virtual) office hours

Mondays 1-2 pm @ <https://ucsd.zoom.us/j/670243214>

Lecture: MWF 11-11:50 AM

Synchronous Lab Open Sessions: WF from 1-3 pm.

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

Course learning objectives:

- **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
- **Communicate** research to peers as well as a broader audience

Notes on our how class will work remotely

I'll livestream and record lectures at the same time as our scheduled class: MWF @ 11 am. These will also be shared **asynchronously** on Canvas. You can join the lectures with the password **neuron**.

You may complete the lab activities with your lab group on your own time, but I encourage you to complete them during our synchronous lab sessions (WF 1-3 pm), when the IAs will be available. To offer assistance.

If you need additional help getting online, please check out this resource from the Teaching+Learning Commons: <https://digitallearning.ucsd.edu/learners/learning-remote.html>. If you're still having issues, please feel free to reach out to the IAs or Dr. J.

Please note that there are **no exams in this class**. Instead, you'll be completing a mix of lab reports, online (open book) quizzes that accompany our smaller labs, and writing assignments (see Grading below).

Tools for this class

LabChart Pro

If you can, please download [LabChart Pro](#) on your personal computer. You'll need the following license codes to do so (input both the base and the "upgrade" codes):

99259 - W44R-9X35-MYFR - LabChart Classroom license Mac 7/8
99558 - 8RLN-A8BZ-32WP LabChart Pro *Upgrade* Classroom Mac 7/8

96525 - G5FA-K5G2-LZZ8-S LabChart for Education v8 PC
97127 - M8BZ-9HRA-6EB9-F - LabChart Pro EDU *Upgrade* v8 PC

In addition, we'll be using an entirely online teaching version of these tools called "Lt." During week 2, you'll receive an invite via an email to join the Lt platform.

Canvas

This course will be using Canvas to manage content and grades, as well as post recorded lectures. You can log in by going to <http://canvas.ucsd.edu>. If you have not used Canvas before, refer to the student help guides and videos, which are located on the left-side menu's help section (the question mark icon). Should you need any technical assistance with Canvas, please alert your instructor and send an email to servicedesk@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*. A PDF of this book can be found under Resources on Canvas. 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](#).

DataHub

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

Grading

- **Laboratory reports** (300 pts): To write these reports (three, 100 pts each), you'll be given data collected by previous BIPN 145 students.
- **Assignments** (300 pts): Includes pre-lab activities and smaller lab write-ups
- **Writing Assignments** (150 pts)

- **Neuroscience in Pop Culture** (100 pts)
- **Smaller writing assignments** (50 pts total): Varied, stay tuned.
- **Final Research Proposal** (250 pts): Design a neuroscience experiment! You'll be asked to develop a feasible and interesting experimental question, and determine the steps to address this question.
 - **Initial proposal** (50 pts): Short, one page proposal about your experiment. This will give the teaching staff a chance to give you feedback on your idea.
 - **Final proposal** (100 pts): A written proposal, details forthcoming.
 - **Presentation** (100 pts): This will be a ~5 minute video that you produce with your group and share to the class about your proposed experiment.

Additional notes on grading

- Lab reports, essays, and assignments will lose -10% for each day they are late.
- Final scores will be converted to letter grades, where A=100-90%, B=89-80%, C=79-70%, D=69-60%, and F=59-0%. 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.

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.

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/>

Course schedule Subject to change. **Does not include all deadlines. Check Canvas for the most updated information.**

Date		Topic	Due/Reading
Week 1			
Mar 30	Lecture	#1: Introduction to (Virtual) BIPN 145	Prepare to introduce yourself over video!
Apr 1	Lecture	#2: Neurons & Nervous Systems & Organize into lab groups	WATCH: JoVE Introduction to Neurophysiology
	Lab	(no lab on this first day – take this time to work out meeting logistics with your group!)	
Apr 3	Lecture	#3: Passive potentials & modeling neural activity	
	Lab	Lab #1: RC Circuits [protocol]	
Week 2			
Apr 6	Lecture	#4: The action potential	READ: Hodgkin & Huxley 1939 DUE @ 5 pm: RC Circuit Quiz
Apr 8	Lecture	#5: Recording from the nervous system	Before this class, make sure you can log into Lt!
	Lab	Lab #2: Recording from the nervous system & using Lt	
Apr 10	Lecture	#6: Earthworm Physiology	
	Lab	Lab #3: Earthworm Experiments in Lt	
Week 3			
Apr 13	Lecture	#7: Writing Lab Reports	DUE @ 5 pm: Electrophysiology Fundamentals (Canvas Quiz)
Apr 15	Lecture	#8: The Speed of the Nervous System	
	Lab	Lab #3 (continued): Analyzing Earthworm Data	
Apr 17	Lecture	#9: Statistics & Coding for Neuroscientists	COMPLETE DataQuest “Programming in Python” and “Variables and Data Types” lessons.
	Lab	Lab #4: Introduction to coding	

Week 4

Apr 20	Lecture	#10: Intracellular recording	
Apr 22	Lecture	#11: Intrinsic physiology & neural computation	
	Lab	Lab #5: Electrophysiological signatures of cell types in mouse & humans	
Apr 24	Lecture	Leech Physiology & Cell Types	WATCH: JoVE Leech Video
	Lab	Lab #6: Leech Virtual Lab in Lt	DUE @ 5 pm: Earthworm Lab Report

Week 5

Apr 27	Lecture	Chemical neurotransmission	DUE @ 5 pm: Cell Types Quiz
Apr 29	Lecture	Spike sorting	
	Lab	Lab #6 (continued): Analyzing Leech Data	
May 1	Lecture	Crayfish & spike adaptation	
	Lab	Lab #7: Spike sorting crawfish data	

Week 6

May 4	Lecture	Introduction to Research Proposals	
May 6	Lecture	Motor circuits & EMG	READ your Drosophila behavior handout
	Lab	Lab #8: EMG lab in Lt	WATCH Re-engineering the brain
May 8	Lecture	Visualizing the nervous system	
	Lab	Lab #10: Visualizing the nervous system	DUE @ 5 pm: EMG "Quiz"

Week 7

May 11		Recording brain activity in humans (Part I)	DUE @ 5 pm: Leech Lab Report
May 13	Lecture	EEG signal processing	DUE @ 5 pm: Microscope Quiz
	Lab	Lab #11: EEG	
