

# BIPN 145 Neurobiology Laboratory

## Spring 2023

### Instructor

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### Instructional Assistants

B01 Kaili Inouye - ([kminouye@ucsd.edu](mailto:kminouye@ucsd.edu))  
B01 Luiza Gaudio ([lgaudio@ucsd.edu](mailto:lgaudio@ucsd.edu))  
B02 Nathan Pongsamart ([npongsam@ucsd.edu](mailto:npongsam@ucsd.edu))  
B02 Jason Yang ([jwy008@ucsd.edu](mailto:jwy008@ucsd.edu))

### (Hybrid) Office hours

Mondays Noon-1PM  
H&SS 1145I or on Zoom:  
(<https://ucsd.zoom.us/j/6858999405>)

### Staff Research Associate

Haley Scott ([hstott@ucsd.edu](mailto:hstott@ucsd.edu))

**Lecture:** A00 (B01+B02) MWF 4-4:50 PM (Cognitive Science Building (CSB) 002/[ZOOM](#))

**Lab:** B01 9:30 AM-12:50 PM (York Hall 1310) T/TH  
B02 2:00-5:20 PM (York Hall 1310) T/TH

**Course website:** On Canvas

## 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
- **Build** an appreciation for and practical insight into the process of research
- **Develop** critical thinking and problem solving in the context of difficult neuro-biological experimentation
- **Communicate** research to peers as well as a broader audience

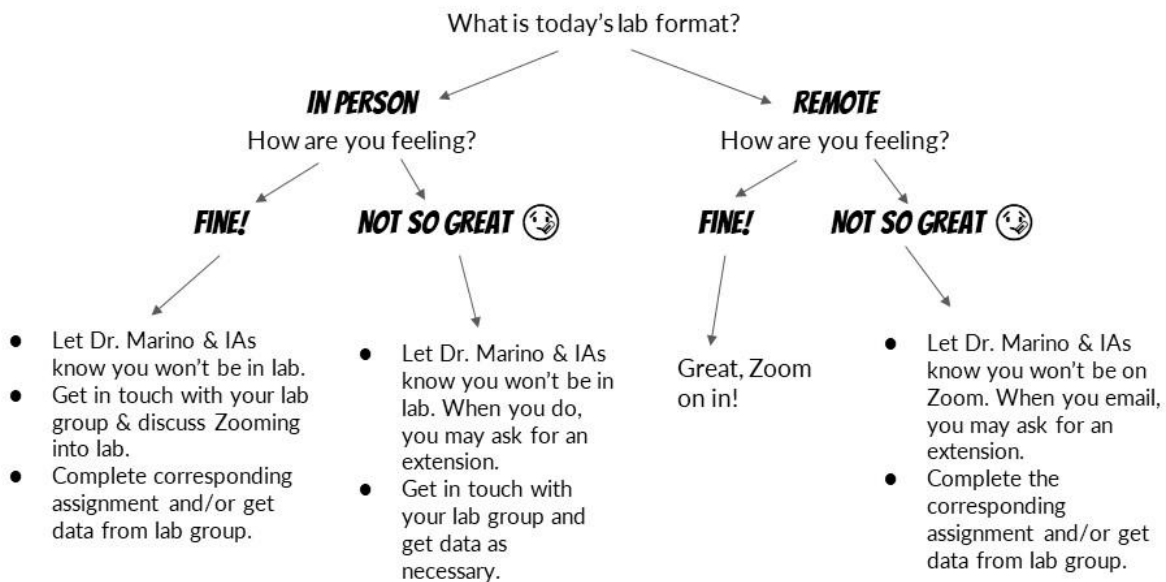
## Notes on COVID-19 Safety

I realize that it is tough to stay engaged and motivated during year three of a global pandemic. I also realize we are all 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. As of Spring quarter 2023 as per UCSD [guidelines](#) masks are no longer required in the classroom and lab. I appreciate your patience as we work together to figure out how to live and learn in these rather unreasonable times. Be aware that these guidelines may change at any time. I encourage everyone to **test regularly** and be **mindful of any viral symptoms**. **If you suspect you have been exposed I encourage you to mask**. **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.**

## 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**. If you cannot attend a lab session due to a positive COVID-19 test, confirmed exposure, or for any other reason, **please contact BOTH the instructor and IAs ASAP (ideally prior to lab time) so that we can work with you on accommodations**. If you do not have a valid excuse for missing the lab or do not contact the instructor, you will be marked as absent and lose points on any assignments related to that particular lab day. Anyone with three or more **unexcused** absences will be at risk of automatically failing the class. I personally believe that there is a benefit to conducting our experiments in-person as well as being in lecture together. **Lecture sessions will be held in person, as well as broadcast on ZOOM synchronously, and podcasted/recorded**, but you will be expected to make up any activities that you missed. Enrolled and waitlisted students must attend the first lab session (on Tuesday, April 4th). Additional details: <http://biology.ucsd.edu/go/ug-labs>. You do not need to inform us if you will be missing a lecture session. See this flow chart:

### ***I HAVE COVID-19 SYMPTOMS, OR RECEIVED A POSITIVE TEST, AND/OR WAS TOLD TO QUARANTINE... WHAT DO I DO?***



## Isolation Policies

If you have any symptoms or test positive for COVID-19 or another respiratory virus such as Flu or RSV, **please stay home**. If you come in close contact with someone who has tested positive for COVID-19 or has COVID-19 symptoms, as per UCSD [guidelines](#) get tested upon your exposure notification and on day 5. **If you develop symptoms stay home**. "In close contact" means you were within 6 feet of this person for more than 15 minutes without a mask. If someone in your lab group

tests positive for COVID-19 you are encouraged to get tested, however “merely being present in the same classroom where all individuals are masked does not meet the public health definition of a close contact.”

### Additional resources

There are many more resources listed [here](#) to help you thrive this quarter. If there is anything you think we can help you out with, please reach out to the IAs or Dr. Marino.

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## Grading

**Laboratory reports** (250 pts, 65-100 pts each)

- Data collected as a group, **written individually**

**Assignments** (300 pts, 10-45 pts each)

- Includes smaller lab write-ups, pre-lab quizzes, lab practicals & class participation

**Final group project** (225 pts)

- Project proposal, presentation, and written report

**Two midterms** (200 pts, 100 pts each)

- Multiple Choice and short answer exams focused on lecture/lab material

**Professionalism** (25 pts)

- Safety, clean up, teamwork, attendance & lab decorum

### Additional notes on grading

- 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: [Late Bank](#)
- Lab reports, essays, and assignments **will lose -10%** for each day they are late without protection from the late bank or a pre-approved extension from the professor.
- 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>.

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## 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 or an IA 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](mailto: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>. We will use the Triton Testing Center (TTC) for OSD tests, please make sure you are signed up on register blast and able to take your exams there.

### 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 before 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 first 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.**

In terms of safety equipment the only requirement is a basic dress code: long pants, closed toed shoes. The lab is BSL0 so there is *no requirement* for lab coats, nor safety glasses/goggles, nor rubber gloves. Please do not bring your lab coat from lab or another lab course. We will provide nitrile gloves and clean lab coats when required.

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## Course management & texts

### 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](mailto: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 a Lab Manual (Bipn 145 Lab Manual (2022), ISBN: 9781533945556) that you can pick up at the UCSD [Bookstore](#). This is an updated lab manual for 2022 that Dr. Juavinett has put together for us. 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](#).

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## Software for this class

Since we'll often be relying on your personal computers (rather than our lab computers), there are also various programs you'll be asked to install and use throughout the quarter. 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.

### Microsoft Office

It will be really 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.**

### Week 1

Apr 3	Lecture	CSB 002/Zoom	Introduction to BIPN 145 + Nervous systems	Take the <a href="#">Incoming Survey</a>
Apr 4	Lab	York 1310	<b>Computer Lab #1:</b> Neuromembrane (Note: This experiment is not in your lab manual! It can be found <a href="#">here</a> .)	<b>Due Prior to First Lab:</b> <a href="#">Lab Safety Quiz</a>
Apr 5	Lecture	CSB 002/Zoom	Passive potentials + Modeling Neural Activity	<b>DUE @ 11:59pm:</b> Neuromembrane Quiz
Apr 6 ( <a href="#">drop deadline for labs</a> )	Lab	York 1310	<b>Experiment #1:</b> RC Circuits	
Apr 7	Lecture	CSB 002/Zoom	The action potential	<b>DUE @ 11:59 pm:</b> RC Circuit Quiz <b>READ:</b> Hodgkin & Huxley 1939

### Week 2

Apr 10	Lecture	CSB 002/Zoom	Recording from the nervous system	
Apr 11	Lab	York 1310	<b>Experiment #2:</b> String Lab	<b>DUE in Lab:</b> Exit Quiz
Apr 12	Lecture	CSB 002/Zoom	Earthworm nervous systems	<b>DUE @ 11:59 PM:</b> String Lab Data
Apr 13	Lab	York 1310	<b>Experiment #3:</b> Earthworm Experiments	<b>READ</b> Earthworm Protocol & <b>DUE @ 9AM:</b> Complete Earthworm Pre-Lab Quiz
Apr 14	Lecture	CSB 002/Zoom	The speed of the nervous system	

### Week 3

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Apr 17	Lecture	CSB 002/Zoom	Reading Papers+Writing Lab Reports	
Apr 18	Lab	York 1310	<b>Experiment #3:</b> Earthworm Experiments/Analysis	Jupyter Hub Coding Intro->Coding & two-sample statistics
Apr 19	Lecture	CSB 002/Zoom	Intracellular & patch clamp recording	
Apr 20	Lab	York 1310	<b>Experiment #4:</b> Intracellular Equipment	<b>READ</b> Leech Intracellular Protocol <b>DUE in Lab:</b> Exit Quiz
Apr 21	Lecture	CSB 002/Zoom	Intrinsic Physiology	

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### Week 4

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Apr 24	Lecture	CSB 002/Zoom	Leech Physiology & Cell Types	<b>DUE @11:59 pm:</b> Earthworm Lab Report
Apr 25	Lab	York 1310	<b>Experiment #4:</b> Recording from the Retzius Cell of the Leech	<b>DUE @ 9AM:</b> Complete Leech Pre-Lab Quiz
Apr 26	No Lecture	Recorded	<b>No Lecture</b> ->See recorded lecture	Recorded Lecture: Leech Lab Report Details and Analyzing Leech Data
Apr 27	Lab	York 1310	<b>Experiment #4:</b> Filling a cell in the Leech	
Apr 28	Lecture	CSB 002/Zoom	Visualizing the Nervous System	

## Week 5

May 1	No Lecture	CSB 002	Review for Midterm #1	
May 2	Lab	York 1310	Experiment #4: Leech Lab Statistics + Analysis Day	
May 3	Lecture	CSB 002/Zoom	Midterm #1	IN PERSON EXAM
May 4	Lab	York 1310	Motor Circuits and EMG + Experiment #5: EMG lab	
May 5	Lecture	CSB 002/Zoom	Ethology and Behavior	Due @ 11:59 pm: EMG Lab Quiz

## Week 6

May 8	Lecture	CSB 002/Zoom	Drosophila behavior	
May 9	Lab	York 1310	Experiment #6: The Case of the Mislabeled Vials (Drosophila Behavioral Experiments)	READ your Drosophila behavioral handout DUE @ 9AM: Complete Drosophila Pre-Lab Quiz
May 10	Lecture	CSB 002/Zoom	Drosophila genetics & optogenetics	
May 11	Lab	York 1310	Experiment #6: The Case of the Missing Methods (Drosophila Optogenetic Experiments)	WATCH Re-engineering the brain
May 12	Lecture	CSB 002/Zoom	Introduction to Final Projects	DUE @11:59 pm: Leech Lab Report



## Week 7

May 15	Lecture	CSB 002/Zoom	Recording & analyzing EEG signals	
May 16	Lab	York 1310	Experiment #7: EEG	
May 17	Lecture	CSB 002/Zoom	Drosophila Presentations (In Person for B01)	<b>DUE @ 12 PM:</b> Drosophila Presentation slides
May 18	Lab	York 1310	Experiment #7: EEG	<b>DUE @ 11:59 PM:</b> Drosophila Methods Assignment
May 19	Lecture	CSB 002/Zoom	Genetic Engineering in Neuroscience	

## Week 8

May 22	Lecture	CSB 002/Zoom	Mapping Neural Circuits + Introduction to the Allen Brain Atlas	<b>DUE Sunday May 21 @ 11:59 pm: Project proposals</b> Submit: <a href="#">Final Project</a> <a href="#">Equipment &amp; Needs Survey</a>
May 23	Lab	York 1310	Computer Lab #2: Mouse brain connectivity	
May 24	Lecture	CSB 002/Zoom	2 Photon and Calcium Imaging	<b>DUE @ 11:59:</b> Computer Lab #2
May 25	Lab	York 1310	Computer Lab #3: Visual perception in a mouse	
May 26	Lecture	CSB 002/Zoom	Human Neuroscience Techniques	<b>DUE @ 11:59:</b> Computer Lab #3

## Week 9

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May 29	No Lecture		Memorial Day	
May 30	Lab	York 1310	Work on final projects	
May 31	Lecture	CSB 002/Zoom	Expectations for final project presentations	
June 1	Lab	York 1310	Work on final projects	
June 2	Lecture	CSB 002/Zoom	Review for Midterm #2	<b>DUE @ 11:59 pm:</b> EEG Lab Report

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## Week 10

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June 5	Lecture	CSB 002/Zoom	Midterm #2	<b>IN PERSON EXAM</b>
June 6	Lab	York 1310	Final Projects analysis & presentation preparation	
June 7	Lecture	CSB 002/Zoom	Careers in neuroscience	
June 8	Final	York 1310	Final project presentations	<b>DUE @ 9AM:</b> Final Presentations
June 9	Final	CSB 002/Zoom	Final project presentations (if necessary)	

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**DUE June 14th @ 11:59 pm:**  
Final project lab reports