

BIPN 145 Neurobiology Laboratory

Winter 2022

Instructor

Marc Marino, PhD
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(Virtual) Office hours

Monday @ 11 AM
(ZOOM Link on Canvas)

Instructional Assistants

Elizabeth Diaz (eld003@ucsd.edu)
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Staff Research Associate

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Lecture: B00 (B01+B02) MWF 1-1:50 PM (Location varies see schedule below CSB 001/ZOOM)

Lab: B01 9:30 AM-12:50 PM (Location varies; see Schedule below York Hall 1310/ZOOM)

B02 2:00-5:20 PM (Location varies; see Schedule below York Hall 1310/ZOOM)

Course website: <https://sites.google.com/ucsd.edu/bipn145> (note that the syllabus found on the course website is for the WF lab section with Dr. J NOT our T/TH sections)

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 two 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.

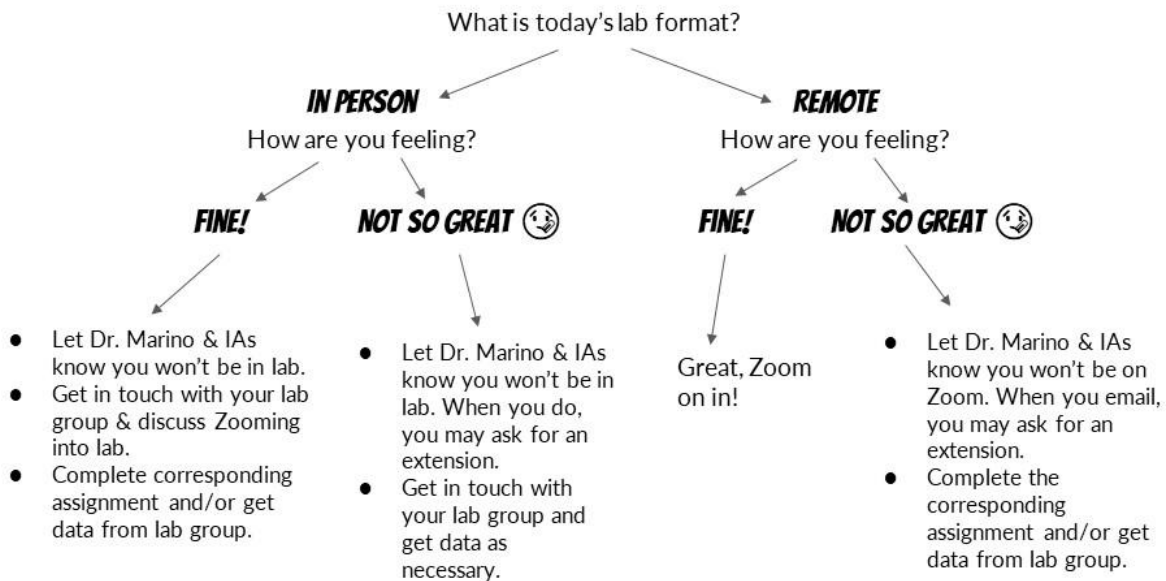
Just before holiday break, UC San Diego decided to switch back to remote learning for at least the first two weeks of the quarter. We’ve done our best to figure out how to teach this course as a hybrid course, and appreciate your collaboration as we try to make the most of it.

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 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.

If you cannot attend a lab session due to a positive COVID-19 test, exposure, or for any other reason, **please contact both the instructor and IAs ASAP so that we can work with you on accommodations**. Enrolled and waitlisted students must attend the first lab session (on Tuesday, September 28th). 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, please stay home. If you come in contact with someone who has tested positive for COVID-19 or has COVID-19 symptoms, **please quarantine for 5 days**. "In contact" means you were within 6 feet of this person for more than 5 minutes without a mask. If someone in your lab group tests positive for COVID-19, you are encouraged but not required to quarantine.

Testing & Masking Policies

Everyone needs to wear a properly fitted mask when we are indoors together, without exception. Currently, the Division of Biology requires an KN95 or Double Mask (disposable cloth mask) indoors in the Lab setting. If you are fully vaccinated, you do not need to complete COVID-19 testing, **but you are still encouraged to.** If you have an exemption and are not fully vaccinated, **you need to complete weekly asymptomatic testing.** [See details here.](#) During each in-person lab section, we will be taking a 10 minute break where we all leave the room to let the air circulate. You are welcome to remove your mask during this break, while you are outside.

Additional resources

If you need additional help getting online, please check out [this resource](#) from the Teaching + Learning Commons. 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.

Grading

Laboratory reports (250 pts)

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

Assignments (325 pts)

- 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 (100 pts each)

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=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.

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 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.**

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.

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, 9781533941329) that you can pick up at the UCSD Bookstore. This is a new lab manual 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](#).

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

Jan 3	Lecture	Zoom	Introduction, Resting membrane potentials & recording from the nervous system	
Jan 4	Lab	Zoom	Virtual Lab #1: Meet your lab group & Neuromembrane, Part I	
Jan 5	Lecture	Zoom	Passive potentials & modeling neural activity	
Jan 6	Lab	Zoom	Virtual Lab #1: Neuromembrane, Parts II & III	DUE @ 11:59 pm: Lab Group Plan
Jan 7	Lecture	Zoom	The action potential	READ: Hodgkin&Huxley 1939

Week 2

Jan 10	Lecture	Zoom	The simplest neural circuits: an introduction to Crescent Loom	DUE @ 5 pm: Neuromembrane
Jan 11	Lab	Zoom	Virtual Lab #2: Crescent Loom, Parts I & II	
Jan 12	Lecture	Zoom	The speed of the nervous system	
Jan 13	Lab	Zoom	Virtual Lab #2: Crescent Loom, THE LOOM OFF.	
Jan 14	Lecture	Zoom	Coding and Statistics in neuroscience & introduction to the Allen Brain Institute datasets	

Week 3 (revised)

Jan 17			<i>No Class - Martin Luther King Day</i>	DUE @ 11:59 pm: Crescent Loom
Jan 18	Lab	Zoom	Virtual Lab #3: Introduction to Jupyter Notebooks	
Jan 19	Lecture	Zoom	Statistics for neuroscience	DUE @ 11:59 pm: Virtual Lab #3 Jupyter Notebooks
Jan 20	Lab	Zoom	Virtual Lab #4: Statistics	
Jan 21	Lecture	Zoom	How to find & read scientific papers	Paper Scavenger Hunt DUE @ 11:59 pm: Virtual Lab #4 Statistics

Week 4 (revised)

Jan 24	Lecture	Zoom	Writing Lab Reports BIPN 145	
Jan 25	Lab	Zoom	Virtual Lab #5: Reaction Time Lab	DUE @ 11:59 pm: Paper Scavenger Hunt
Jan 26	Lecture	Zoom	Intrinsic physiology & neural computation	
Jan 27	Lab	Zoom	Virtual Lab #6: Allen Cell Types	
Jan 28	Lecture	Zoom	Intrinsic physiology & neural computation+Genetic Engineering Details for Midterm #1	

Week 5

Jan 31	Lecture	Zoom	Comparative anatomy, or, does size matter?	DUE @ 11:59 pm: Virtual Lab #6 Allen Cell Types
Feb 1	Lab	Zoom	Virtual Lab #7: Comparative anatomy	
Feb 2	Lecture	Zoom	Mapping neural circuits	DUE @ 11:59 pm: Virtual Lab #7 Comparative Anatomy Data
Feb 3	Lab	Zoom	Virtual Lab #8: Allen Connectivity	
Feb 4	Lecture	Zoom	Review for Midterm #1 & Introduction to final projects	Online Safety Test DUE @ 11:59 pm: Reaction Time Lab Report

Week 6

Feb 7	Lecture	On Canvas	Midterm #1	
Feb 8	Lab	York 1310	Experiment #1: String Nervous Systems & Lab Chart practical	Due Prior to Lab: Online Safety Test DUE @ 11:59 pm: Virtual Lab #8 Allen Connectivity Data
Feb 9	Lecture	Cognitive Science Building 001/Zoom	Recording from the nervous system + Intracellular recording equipment	
Feb 10	Lab	York 1310	Experiment #2: Intracellular Recording	
Feb 11 (drop date)	Lecture	Cognitive Science Building 001/Zoom	Extracellular Recordings + Final Projects Introduction	DUE @ 5 pm: String Lab

Week 7

Feb 14	Lecture	Cognitive Science Building 001/Zoom	Leech Physiology & Cell Types	READ the leech protocol and complete the pre-lab quiz
Feb 15	Lab	York 1310	Experiment #3: Recording from a Retzius cell in the leech	
Feb 16	Lecture	Cognitive Science Building 001/Zoom	Visualizing the nervous system	
Feb 17	Lab	York 1310	Experiment #4: Filling a cell in the leech	
Feb 18	Lecture	Cognitive Science Building 001/Zoom	Drosophila Ethology and Behavior	

Week 8

Feb 21			<i>No lecture - President's Day</i>	DUE @ 11:59 pm: Project proposals
Feb 22	Lab	York 1310	Experiment #5: The Case of the Mislabeled Vials (Drosophila Behavioral Assays)	READ your Drosophila behavior handout & complete the pre-lab quiz
Feb 23	Lecture	Cognitive Science Building 001/Zoom	Drosophila genetics & optogenetics	
Feb 24	Lab	York 1310	Experiment #6: The Case of the Missing Methods (Drosophila Optogenetics)	DUE @ 11:59 pm: Drosophila Methods Protocol for Exp #6
Feb 25	Lecture	Zoom	Drosophila Presentations	Due @ 12:00 pm: Drosophila Presentations for Exp #5

Week 9

Feb 28	Lecture	Cognitive Science Building 001/Zoom	Recording & analyzing EEG signals	DUE @ 11:59 pm: Leech Lab Report
Mar 1	Lab	York 1310	Experiment #7: EEG	complete the pre-lab quiz No Prelab Quiz for EEG
Mar 2	Lecture	Cognitive Science Building 001/Zoom	Two-photon calcium imaging & the visual system	
Mar 3	Lab	York 1310	Work on final projects	
Mar 4	Lecture	Cognitive Science Building 001/Zoom	Information for final presentations and Review for Midterm #2	DUE @ 11:59 pm: EEG Lab Quiz

Week 10

Mar 7	Lecture	On Canvas	Midterm #2	
Mar 8	Lab	York 1310/Zoom	Work on final projects	
Mar 9	Lecture	Cognitive Science Building 001/Zoom	Careers in neuroscience and Prep period for final project presentations	
Mar 10	Lab	York 1310	Final project presentations	Presentation Due Prior to Lab
Mar 11	Lecture	Cognitive Science Building 001/Zoom	Final project presentations (if necessary)	

DUE Mar 16th @ 11:59 pm:
Final project lab reports