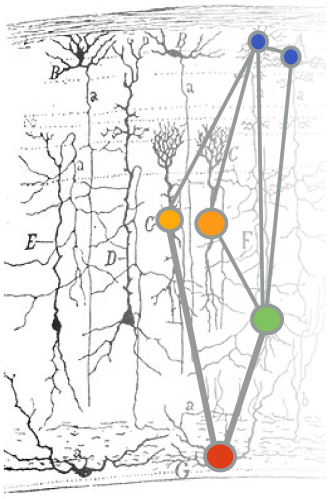

BIPN 145 Neurobiology Laboratory

Winter 2023

Instructor
Marc Marino, PhD
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Instructional Assistants
- ()
Luiza Gaudio (lgaudio@ucsd.edu)
Celina Savo (csavo@ucsd.edu)
Xavier Zhou (xiz056@ucsd.edu)

(Hybrid) Office hours
Monday @ 4 PM
H&SS 1145I or on Zoom:
(https://ucsd.zoom.us/j/6858999405)

Staff Research Associate
Haley Scott (hstott@ucsd.edu)

Lecture: A00 (B01+B02) MWF 1-1:50 PM (Franklin Antonio Hall (FAH) 1450/ZOOM)
Lab: B01 9:30 AM-12:50 PM (York Hall 1310)
B02 2:00-5:20 PM (York Hall 1310)

Course website: On Canvas

Course learning objectives:

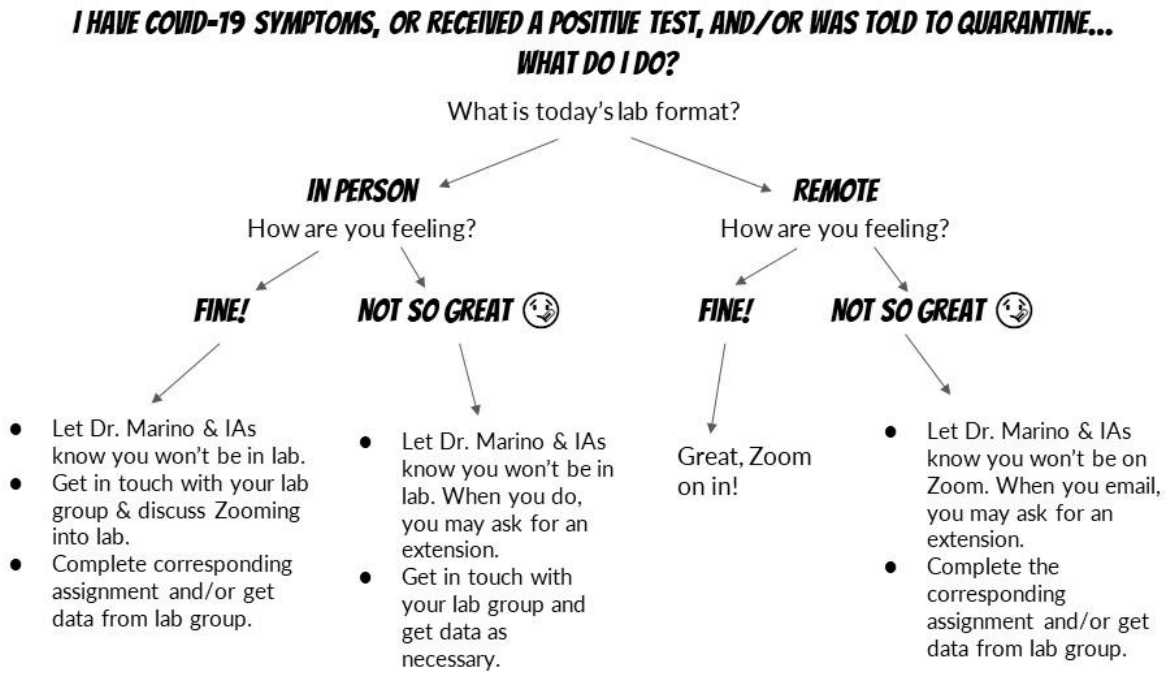
- **Collect** and **evaluate** neural data from various organisms
- **Apply** principles of neural communication to multiple model systems
- **Describe** the breadth of techniques in neuroscience and the experimental questions they are suited to answer
- **Build** an appreciation for and practical insight 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 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 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 Winter 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, January 10th). 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:



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.

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.

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) 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.**

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.

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 (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.

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 9	Lecture	FAH 1450/Zoom	Introduction to BIPN 145 + Nervous systems	Take the Incoming Survey
Jan 10	Lab	York 1310	**Computer Lab #1:** Neuromembrane (Note: This experiment is not in your lab manual! It can be found here.)	**Due Prior to First Lab**: Lab Safety Quiz
Jan 11	Lecture	FAH 1450/Zoom	Passive potentials + Modeling Neural Activity	**DUE @ 11:59pm**: Neuromembrane Quiz
Jan 12 (drop deadline for labs)	Lab	York 1310	**Experiment #1:** RC Circuits	
Jan 13	Lecture	FAH 1450/Zoom	The action potential + Recording from the nervous system	**DUE @ 11:59 pm**: RC Circuit Quiz **READ**: Hodgkin & Huxley 1939

Week 2

Jan 16			*No Class or Lab (MLK Jr. Day)*	
Jan 17	Lab	York 1310	**Experiment #2:** String Lab	**DUE in Lab**: Exit Quiz
Jan 18	Lecture	FAH 1450/Zoom	Earthworm nervous systems	
Jan 19	Lab	York 1310	**Experiment #3:** Earthworm Experiments	**READ** Earthworm Protocol & **DUE @ 9AM**: Complete Earthworm Pre-Lab Quiz
Jan 20	Lecture	FAH 1450/Zoom	Coding & two-sample statistics	**DUE @ 11:59 PM**: String Lab Data

Week 3

Jan 23		FAH 1450/Zoom	Writing Lab Reports	
Jan 24	Lab	York 1310	**Experiment #3:** Earthworm Experiments/Analysis	Jupyter Hub Coding Intro
Jan 25	Lecture	FAH 1450/Zoom	Intracellular & patch clamp recording	
Jan 26	Lab	York 1310	**Experiment #4:** Intracellular Equipment	**READ** Leech Intracellular Protocol **DUE in Lab**: Exit Quiz
Jan 27	Lecture	FAH 1450/Zoom	The speed of the nervous system	

Week 4

Jan 30	Lecture	FAH 1450/Zoom	Leech Physiology & Cell Types	**DUE @11:59 pm**: Earthworm Lab Report
Jan 31	Lab	York 1310	**Experiment #4:** Recording from the Retzius Cell of the Leech	**DUE @ 9AM**: Complete Leech Pre-Lab Quiz
Feb 1	Lecture	FAH 1450/Zoom	Intrinsic Physiology	
Feb 2	Lab	York 1310	**Experiment #4:** Filling a cell in the Leech	
Feb 3	Lecture	FAH 1450/Zoom	Leech Lab Report Details + **Review for Midterm #1**	

Week 5

Feb 6	No Lecture	FAH 1450	**Midterm #1**	**IN PERSON EXAM**
Feb 7	Lab	York 1310	**Experiment #4**: Leech Lab Statistics + Analysis Day	
Feb 8	Lecture	FAH 1450/Zoom	Motor Circuits and EMG	
Feb 9	Lab	York 1310	**Experiment #5:** EMG lab	
Feb 10	Lecture	FAH 1450/Zoom	Guest Lecture: Dr. Alicia Avelar-ETOH Self Administration and behavior in Rodent models: "Sex differences in High Intensity binge users of ethanol in ethanol vapor self-administering Wistar rats"	**Due @ 11:59 pm**: EMG Lab Quiz

Week 6

Feb 13	Lecture	FAH 1450/Zoom	Ethology and Behavior: Drosophila behavior	
Feb 14	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
Feb 15	Lecture	FAH 1450/Zoom	Drosophila genetics & optogenetics	
Feb 16	Lab	York 1310	**Experiment #6:** The Case of the Missing Methods (Drosophila Optogenetic Experiments)	WATCH Re-engineering the brain
Feb 17	Lecture	FAH 1450/Zoom	**Introduction to Final Projects +** Recording & analyzing EEG signals	**DUE @11:59 pm**: Leech Lab Report

Week 7

Feb 20			*No Class or Lab (President's Day)*	
Feb 21	Lab	York 1310	**Experiment #7:** EEG	
Feb 22	Lecture	Zoom	Drosophila Presentations	**DUE @ 12 PM:** Drosophila Presentation slides
Feb 23	Lab	York 1310	**Experiment #7:** EEG	**DUE @ 11:59 PM:** Drosophila Methods Assignment
Feb 24	Lecture	FAH 1450/Zoom	Visualizing the Nervous System	

Week 8

Feb 27	Lecture	FAH 1450/Zoom	Mapping Neural Circuits + Introduction to the Allen Brain Atlas	**DUE NOV 13th @ 11:59 pm: Project proposals**
Feb 28	Lab	York 1310	**Computer Lab #2**: Mouse brain connectivity	
Mar 1	Lecture	Zoom	Genetic Engineering +2 Photon	**DUE @ 11:59:** Computer Lab #2 **Submit:** Final Project Equipment & Needs Survey
Mar 2	Lab	York 1310	**Computer Lab #3:** Visual perception in a mouse	
Mar 3	Lecture	Zoom	**Review for Midterm #2**	**DUE @ 11:59:** Computer Lab #2

Week 9

Mar 6	Lecture	FAH 1450	**Midterm #2**	**IN PERSON EXAM**
Mar 7	Lab	York 1310	**Work on final projects**	
Mar 8	Lecture	FAH 1450/Zoom	Comparative Neuroanatomy	**DUE @ 11:59 pm**: EEG Lab Report
Mar 9	Lab	York 1310	**Work on final projects**	
Mar 10	Lecture	FAH 1450/Zoom	Human Neuroscience	

Week 10

Mar 13	Lecture	FAH 1450/Zoom	**Expectations for final project presentations**	
Mar 14	Lab	York 1310/Zoom	**Final Projects analysis & presentation preparation**	
Mar 15	Lecture	Zoom	Careers in neuroscience	
Mar 16	Lab	York 1310	**Final project presentations**	**DUE @ 9AM**: Final Presentations
Mar 17	Lecture	FAH 1450/Zoom	**Final project presentations**	(If necessary)
				DUE Mar 22nd @ 11:59 pm: Final project lab reports