

BIPN 140 - Cellular Neurobiology Winter 2022 Syllabus

INSTRUCTOR: Matthew Lovett-Barron, Ph.D.

LOCATION: Fully remote for this quarter

See Canvas for details - in "Zoom LTI PRO" panel

TIME: Tuesdays and Thursdays, from 12:30 to 1:50pm

TEXTBOOK: *Neuroscience*, Purves et al. 6th edition, Sinauer Associates Publishers

The objectives of this class are to learn **how neurons work**, and **what they can do**. We will focus on the electrical and biochemical properties of neuronal membranes (*Lecture 1-6*), examine how these properties enable communication between neurons (*Lectures 7-12*), study specialized neurons that sense aspects of the external environment (*Lectures 13-15*), and consider the developmental and evolutionary origins of neural circuits (*Lectures 16-18*).

DATE		LECTURE TOPIC	TEXT	Problem set
Jan	4	(1) Cells of the nervous system, and how to study them	Ch 1	
	6	(2) The Passive Membrane I	Ch 2	
				Problem set 1
	11	(3) The Passive Membrane II	Ch 2-3	
	13	(4) The Active Membrane I	Ch 3	
				Problem set 2
	18	(5) The Active Membrane II	Ch 3-4	
	20	(6) Structural basis of ion flux	Ch 4	
				Problem set 3
	25	MIDTERM EXAM 1 (Lec 1-6)		
	27	(7) Synaptic Transmission I	Ch 5	
				Problem set 4
Feb	1	(8) Synaptic Transmission II	Ch 5-6	
	3	(9) Synaptic Transmission III	Ch 6	
				Problem set 5
	8	(10) Intracellular Signaling	Ch 7	
	10	(11) Synaptic Plasticity I	Ch 8	
				Problem set 6
	15	(12) Synaptic Plasticity II	Ch 8	
	17	MIDTERM EXAM 2 (Lec 7-12)		
	22	(13) Sensory transduction I	Ch 11 (238-258)	
	24	(14) Sensory transduction II	Ch 9 (193-202); Ch 13 (284-298); Ch 14 (305-312);	
				Problem set 7
Mar	1	(15) Sensory transduction III	Ch 10 (213-216); Ch 15 (330-338, 348-353);	
	3	(16) Neural development I	Ch 22	
				Problem set 8
	8	(17) Neural development II	Ch 23	
	10	(18) Neural evolution	-----	
	15	FINAL EXAM, comprehensive		

GENERAL INFORMATION:

Instructors:

Professor:

Dr. Matthew Lovett-Barron (mlb@ucsd.edu)

Please use Canvas to contact Dr. Lovett-Barron and the IAs, rather than email.

Faculty Office Hours:

Tuesdays, from 3-4pm over zoom. By appointment – request by contacting Dr. Lovett-Barron via canvas. <https://ucsd.zoom.us/j/93028502102>

Instructional Assistants (IAs):

IA	Email	Discussion Section	Office Hours
Carmine Chavez-Martinez	cchavezm@ucsd.edu	A1) Monday at 8am A2) Monday at 11am	By appointment
Timothy Nakhla	tnakhla@ucsd.edu	A3) Friday at 3pm	By appointment
Vy Nguyen	vxnguyen@ucsd.edu	A4) Friday at 4pm	By appointment

Additional test reviews will be hosted by the course IAs on the evening before each exam:

1st midterm review, Jan 24 @ 630pm.

2nd midterm review, Feb 16 @ 630pm.

Final exam review, March 14 @ 630pm.

Discussion sections are held over zoom. See *Canvas* in “Zoom LTI PRO” panel

Required text book:

Neuroscience, Purves et al. (6th edition, Sinauer Associates Publishers)

Free access to the ebook is provided for the first two weeks of class (until drop/add ends) via RedShelf in Canvas. At that time students **can opt out** of purchasing the ebook.

Questions: textbooks@ucsd.edu, [RedShelf Solve](#), [Inclusive Access FAQ page](#).

Supplemental texts (not required)

Principles of Neural Science, Kandel and Schwartz

Principles of Neurobiology, Luo

Ionic Channels of Excitable Membranes, Hille

Lecture Notes:

A pdf of the lecture slides will be posted on Canvas immediately before the lectures. Lectures will be podcast (audio and slides), but important course material will be written on the board so it will be important to attend lectures in order to get all the required information to learn the material and perform well on exams.

If you have questions concerning how to access course materials on Canvas, please contact Academic and Computing Services: <http://acms.ucsd.edu/>.

Grading

Discussion Attendance	10%	(40 pts)
Midterm Exam 1	25%	(100 pts)
Midterm Exam 2	25%	(100 pts)
Final Exam	40%	(160 pts)

This is a 4-unit class, and is graded on a curve. See CAPES to get a sense of the average grades in this course.

The grade in the course depends on two midterm exams and a final exam. The two midterms are each worth 25% of the grade and the final is worth 40%. Exams will consist of short answers, problem solving, and data interpretation. Midterm 1 covers materials from lectures 1-6, Midterm 2 covers materials from lectures 7-12, and the Final exam comprehensively covers material from the whole course. All tests will be in the format of take-home open-note assignments through Canvas. Review sessions will be held the day before each exam.

You will be tested based on the lecture material, readings, handouts, and problem sets, but not the primary research papers. I will discuss the results of such papers in lectures; the full papers are included for your interest and to provide context.

Additional Materials:

Within Canvas, we will include material that will help complement the lectures and the textbook reading. The most important of these are the problem sets, discussed below. Additional materials include short handouts about specific topics, animated videos explaining concepts, review articles to provide historical perspective, and primary research articles.

Problem Sets:

The 8 problem sets over the course of the quarter consist of questions that will help you evaluate your understanding of the material covered in the lectures and the reading. They are similar to questions you will have to answer on exams. They are not graded, but to get the most out of them, treat them like exams. In the past there has been an excellent correlation between those who worked through the problem sets and those who received high grades in the course. Problem sets will be released on Thursdays and discussed in the sections on Friday and Monday. The answer key will be posted after the Monday discussion sections.

Discussions:

Discussion sessions will start the week of **Jan 10**. There will be **no discussion sessions during the first week**. Attendance at each session is worth 4 points and general participation across all discussions is worth up to 4 points (9 sessions x 4 points + 4 participation points = 40 points total; this equates to 10% of the final grade). The sections are useful opportunities to ask questions about the lectures, handouts & readings and will be structured around working through solutions to several questions on the problem sets.