

BIPN 140 - Cellular Neurobiology

Winter 2023 Syllabus

INSTRUCTOR: Matthew Lovett-Barron, Ph.D.

LOCATION: Tata Hall 3201

TIME: Tuesdays and Thursdays, from 2:00 to 3:20pm

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

GENERAL INFORMATION

Instructors

Professor

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

Office Hours

Thursdays, from 11am-noon in Tata Hall 3101

Instructional Assistants (IAs)

IA	Email	Discussion Section
Ziyuan (Su) Shu	zshu@ucsd.edu	A1) Zoom – time TBD
Erin Li	wel055@ucsd.edu	A2) Zoom – time TBD
Marissa Garcia	mag039@ucsd.edu	A3) Zoom – time TBD A4) Zoom – time TBD

IAs will poll the class to determine a time for Discussion sections over zoom.

IAs will also host a study preparation meeting on the day before each midterm/exam.

IA office hours

Time and location to be announced via Canvas

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

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 via RedShelf in Canvas. At that time students can opt out of purchasing the ebook. If you have questions, please see: 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 before the lectures. Lectures will be podcast and posted on Canvas (audio and slides), but important course material may be written on the board during class so it will be beneficial 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

Weekly online quizzes	20% of final
Midterm exam 1	25% of final
Midterm exam 2	25% of final
Final exam	30% of final

This is a 4-unit class. The grade in the course depends on two midterm exams and a final exam, in addition to online quizzes. You will not be graded for class or discussion attendance, though we have found that students who attend class and discussion sections achieve the best results on quizzes and exams.

There will be seven open-note quizzes, and your quiz grade (20% of total) will be determined from the top five scores (lowest two quiz scores will be dropped). Quizzes will become available on Canvas on Thursday evenings, and will be due by Monday evening.

The two midterms are each worth 25% of the grade and the final is worth 30%. These exams will be in-person, and you will not be allowed notes. You will be allowed calculators for solving math problems, but phones are not permitted. 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. Questions will consist of multiple choice, short answer, and longer problem-solving tasks.

You will be tested based on materials from the lectures, readings, handouts, and quizzes. I will discuss some primary research papers in lectures and include these papers on Canvas, but you will not be directly tested on their content.

Grades will not be curved, nor will any individual grades be rounded up or down. Grades are determined according to the criteria outlined above.

If requesting accommodations or exceptions for medical reasons, please contact the OSD as soon as you can (<https://osd.ucsd.edu/>).

Grading rubric for transformation of percentage to letter grade:

Name:	Range:	
A+	100 %	to 97.0%
A	< 97.0 %	to 94.0%
A-	< 94.0 %	to 90.0%
B+	< 90.0 %	to 87.0%
B	< 87.0 %	to 84.0%
B-	< 84.0 %	to 80.0%
C+	< 80.0 %	to 77.0%
C	< 77.0 %	to 74.0%
C-	< 74.0 %	to 70.0%
D	< 70.0 %	to 60.0%
F	< 60.0 %	to 0.0%

Additional Materials:

Within Canvas, we will include material that will help complement the lectures and the textbook reading, including short handouts about specific topics, videos explaining concepts, review articles to provide historical perspective, and primary research articles. We will also provide practice quizzes and tests.

Discussions:

Discussion sessions are useful opportunities to interact with the IAs and ask questions about practice questions, quizzes, lectures, handouts & readings. While attendance is neither mandatory nor graded, we have found that students that participate in discussion sections perform better on the exams.

Please note that we reserve the right to change aspects of the course during the quarter, including those outlined in this syllabus. If we do so, we will issue an announcement in Canvas.