MCB 163L: Neuroanatomy Laboratory
Spring 2021

Course description
This course provides you with a basic understanding of the principles of brain structures and function. These concepts will be useful in graduate or medical studies, and they can refine your ideas about biological complexity and order. The course is designed to prepare you for the advanced neuroscience courses that are an essential part of the postgraduate curriculum. Our emphasis is, therefore, more integrative and broadly-based than in most neuroanatomy courses. In addition to the fundamental structural biology of the central and autonomic nervous systems we will study the sensory, motor and limbic systems, as well as aspects of neurochemistry, action potential conduction and neuropathology. You will analyze data from electrophysiology, imaging, cell biology and genetics experiments to gain a better understanding of key principles in neuroscience. In addition, you will learn how to design experiments, troubleshoot experiments, analyze your data, and present your findings in written reports.

Prerequisites: Bio 1A/1AL; MCB 160 or equivalents

Course organization
The course is entirely online for this semester. Each week will be devoted to one lab. Every week there will be:
1. One hour of lecture that will introduce you to that week's lab. The one hour lecture will be synchronous – meaning they will be held Mondays 2-3 pm via Zoom (links will be posted on bCourses). Lectures will also be recorded, but we encourage to attend the synchronous lectures whenever possible.
2. Two lab sections that are two hours each via Zoom. The lab sections are only synchronous – meaning they will NOT be recorded and you are expected to attend. See the schedule below (links will be posted on bCourses).
3. Material needed for each lab will be provided via bCourses.
4. Students will be organized into lab groups for the purposes of working together to complete the labs and to do the final project.

Instructors
Robin Ball (she/her, course director), rwball@berkeley.edu
Tamira Elul (she/her), tamiraelul@berkeley.edu
Richard Kramer (he/him), rhkramer@berkeley.edu

Graduate student instructors

GSI	Email	Section
Julia Bleier (she/her)	bleier@berkeley.edu	101: T/Th 9am-11am
Erin Aisenberg (she/her)	erinaisenberg@berkeley.edu	102: T/Th 2-4pm
Sonali Mali (she/her)	smali@berkeley.edu@berkeley.edu	103: W/F 2-4pm

All office hours for instructors and GSIs will be announced and posted on bCourses

Lab material
1. We will provide sections from a lab manual on bCourses for each lab.
2. Sometimes we will provide videos showing the techniques and these should be watched prior to your lab section. Experimental aspects of the labs that you will learn from these videos will be included in lab assignments and/or exams.
3. Sample data will be provided via bCourses.
4. Assignments will be provided for each lab and will be due on Sundays at 11:59pm following the lab sections.

Textbook
There is no required textbook for this course, but you may need to refer to a neuroscience textbook such as:

1. Kandel, E.R., Schwartz, J.H., Jessell, T.M. , Siegelbaum, S.A. , Hudspeth, A.J. Principles of Neural Science. 5th edition, McGraw-Hill, 2013. Available online through the UCB library.
2. Luo, L. Principles of Neurobiology. 1st edition. Garland Science, 2015.
3. Martin, J.H. Neuroanatomy. Text and Atlas. Fourth edition. McGraw-Hill, 2012.

Assignments and grades

Lab assignments	25 %
2 Lab Reports	20 %
Presentation	5 %
Exam 1	20 %
Exam 2	30 %

The course will not be curved. You are not in competition with other students in the class and we encourage you to work collaboratively. The grading scale is shown below. At the end of the semester, if the overall course average is low, we will shift the grading scale in your favor. Think of these percentages as the minimum you need to achieve this grade.

>93% A	77-80% C+	>70% P
90-93% A-	73-77% C	<70% NP
87-90% B+	70-73% C-	<60% F
83-87% B	67-70% D+	
80-83% B-	60-67% D	

Lab assignments
You will be completing a lab assignment for each lab. The instructions for these assignments will be provided on bCourses. Your assignments will include a summary of the procedures, graphs, images and analysis you generate for the lab. Lab assignments will be due through bCourses on Sundays at 11:59pm Pacific Time. These will be valuable resources when you study for the exams. Your lowest lab assignment score will be dropped.

Lab reports
You will write two lab reports. Guidelines for each report will be provided on bCourses. Think of the lab reports as journal articles where you can describe your experiments and results. You will upload your lab reports in pdf format directly into bCourses. Lab reports are due at 11:59pm on the due date. You may not share graphs and/or analysis with your lab group. Everyone needs to make their own figures. Each student should write their own lab reports using their own words.

Final presentation
At the end of the semester, you will work on your final group project using data in the Allen Brain Atlas. Groups will present their findings during the last week of class. Everyone is expected to attend the final presentations.

Online exams
There are two exams in this course: Exam 1 is focused on neuroanatomy and covers material from Labs 1-3 and Exam 2 covers the experimental labs with material from Labs 4-9. The exams will be 2 hours long and will take place online (on Gradescope).

Exam 1 will take place **Friday February 19**. Exam 2 will take place on **Tuesday April 13**. You will get 2 hours to complete the exam online, but you may access it at any point on exam day (Pacific Time). The exams will be open-note, but you will not have enough time to complete the exam if you look up all the information. Please study for the exam as you would for an in-class exam. You are not allowed to collaborate or discuss the exam with other students in class. You are expected to complete your own work and will sign an honor code statement at the start of the exams.

Attendance in lab
Attendance in laboratory sessions is **highly recommended.** These will not be recorded. If you come to lab section prepared to work, you should be able to complete most of the lab assignment during lab section working with other students.

Student Honor Code
The student community at UC Berkeley has adopted the following Honor Code:
"As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others."
The hope and expectation is that you will adhere to this code.

Collaboration and Independence: Reviewing lecture and reading materials and studying for exams can be enjoyable and enriching things to do with fellow students. This is recommended. However, unless otherwise instructed, lab reports are to be completed independently and materials submitted as lab reports should be the result of one's own independent work.

Cheating: A good lifetime strategy is always to act in such a way that no one would ever imagine that you would even consider cheating. Anyone caught cheating on an exam in this course will receive a failing grade in the course and will also be reported to the University Center for Student Conduct. In order to guarantee that you are not suspected of cheating, please keep your eyes on your own materials and do not converse with others during exams. Do not discuss the exam with anyone else in the class until everyone has taken the exam.

Plagiarism: To copy text or ideas from another source without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism and how to avoid it, see, for example: http://gsi.berkeley.edu/teachingguide/misconduct/prevent-plag.html. All lab reports will be checked for plagiarism by using Turnitin that compares reports to other students in the class and to websites. Use your own words unless you are using a direct quote.

Academic Integrity and Ethics: Cheating on exams and plagiarism are two common examples of dishonest, unethical behavior. Honesty and integrity are of great importance in all facets of life. They help to build a sense of self-confidence, and are key to building trust within relationships, whether personal or professional. There is no tolerance for dishonesty in the academic world, for it undermines what we are dedicated to doing – furthering knowledge for the benefit of humanity.

Your experience as a student at UC Berkeley is hopefully fueled by passion for learning and replete with fulfilling activities. We appreciate that being a student may be stressful. There may be times when there is temptation to engage in some kind of cheating in order to improve a grade or otherwise advance your career. This could be as blatant as having someone else sit for you in an exam, or submitting a written assignment that has been copied from another source. It could be

as subtle as glancing at a fellow student's exam when you are unsure of an answer to a question and are looking for some confirmation. One might do any of these things and potentially not get caught. However, if you cheat, no matter how much you may have learned in this class, you have failed to learn perhaps the most important lesson of all.

Safe, Supportive, and Inclusive Environment
Whenever a faculty member, staff member, post-doc, or GSI is responsible for the supervision of a student, a personal relationship between them of a romantic or sexual nature, even if consensual, is against university policy. Any such relationship jeopardizes the integrity of the educational process. Although faculty and staff can act as excellent resources for students, you should be aware that they are required to report any violations of this campus policy. If you wish to have a confidential discussion on matters related to this policy, you may contact the Confidential Care Advocates on campus for support related to counseling or sensitive issues. Appointments can be made by calling (510) 642-1988.

The classroom, lab, and workplace should be safe and inclusive environments for everyone. The Office for the Prevention of Harassment and Discrimination (OPHD) is responsible for ensuring the University provides an environment for faculty, staff and students that is free from discrimination and harassment on the basis of categories including race, color, national origin, age, sex, gender, gender identity, and sexual orientation. Questions or concerns? Call (510) 643-7985, email ask_ophd@berkeley.edu, or go to http://survivorsupport.berkeley.edu/.

Diversity statement
The University of California considers the diversity of its students, faculty, and staff to be a strength and critical to its educational mission. Our community is enriched and enhanced by diversity along a number of dimensions, including race, ethnicity, national origins, gender, sexuality, class and religion. We welcome all our students in our class and hope that you always feel included. If there are aspects of the instruction within this course that result in barriers to your inclusion, please let us know. Your suggestions are encouraged and appreciated.

DSP accommodations
Students who need academic accommodations, should request them from the Disabled Students' Program, 260 César Chávez Center, 642-0518 (voice or TTY), https://dsp.berkeley.edu. DSP is the campus office responsible for verifying disability-related need for academic accommodations, assessing that need, and for planning accommodations in cooperation with students and instructors as needed and consistent with course requirements.

We are committed to fully supporting our students with disabilities, including meeting accommodations listed in a DSP letter. If you would like to discuss your accommodations with an instructor, please reach out to us.

Mental Health and Wellness
All students – regardless of background or identity – may experience a range of issues that can become barriers to learning. These issues include, but are not limited to, strained relationships, anxiety, depression, alcohol and other drug problems, difficulties with concentration, sleep, and eating, and/or lack of motivation. Such mental health concerns can diminish both academic performance and the capacity to participate in daily activities.

In the event that you need mental health support, or are concerned about a friend, UC Berkeley offers many services, such as free short-term counseling at University Health Services. A list of resources can be found here: https://uhs.berkeley.edu/sites/default/files/mhresources.pdf
A campus website having links to many resources is: https://recalibrate.berkeley.edu/

Remember that seeking help is a good and courageous thing to do – both for yourself and for those who care about you.

Services for Students Encountering Food and Housing Insecurity
If you are in a situation where you are facing challenges in gaining access to nutritious, affordable food during the semester, you can find help by going to the UC Berkeley basic needs program at http://basicneeds.berkeley.edu/ or the UC Berkeley Food Pantry at https://pantry.berkeley.edu/. You may be eligible for the CalFresh program as well.

Letters of Recommendation
Any of the three instructors may be approached for a letter of recommendation. We are willing to provide a written evaluation for this purpose. So that we may prepare effective evaluations we ask that you follow the procedure outlined here. Attend office hours if you have questions. Ask your laboratory section GSI to write a couple of paragraphs about your participation in section. Sometime after the end of the course, send a copy of your CV or resume and Personal Statement to the instructor and GSI. Please note that some instructors get asked for letters from many students and will only be able to accommodate a certain number of requests.

Schedule

Date	Day	Lab/Lecture	Assignments due
Neuroanatomy			
Jan 19/20	Tu/W	Library exercise, introduction to course	
Jan 21/22	Th/Fr	Start working on Lab 1	
Jan 25	*M*	*Lec 1: Organization of brain (TE)*	
Jan 26-29	Tu-F	Lab 1: Visible Body app – brain, spinal cord and cross sections, cranial nerves	Lab 1 due Jan 31
Feb 1	*M*	*Lec 2: Vision and auditory (TE)*	
Feb 2-5	Tu-F	Lab 2: Visible Body app – eye and ear anatomy, cranial nerves	Lab 2 due Feb 7
Feb 8	*M*	*Lec 3: Reflexes (sensory and motor pathways) (TE)*	
Feb 9-12	Tu-F	Lab 3: Neurological exam and case studies	Lab 3 due Feb 14
Feb 15	*M*	*No class*	
Feb 16-17	Tu/W	Anatomy review	
Feb 19	F	Exam 1 covers labs 1-3	Exam 1 Feb 19
Model organisms and research techniques			
Feb 22	*M*	*Lec 4: Immunocytochemistry and fluorescent microscopy (RK)*	
Feb 23-26	Tu-F	Lab 4: Immunocytochemistry of cytoskeleton	Lab 4 due Feb 28
Mar 1	*M*	*Lec 5: C. elegans axon guidance (RB)*	
Mar 2-5	Tu/W	Lab 5: C. elegans axon guidance	Lab 5 **report** due Mar 14

Mar 8	*M*	*Lec 6: Action potential conduction (RK)*	
Mar 9-12		Lab 6: Earthworm action potential	Lab 6 due Mar 14
Mar 15	*M*	*Lec 7: Drosophila neuromuscular junction and optogenetics (RK)*	
Mar 16-19	Tu-W	Lab 7: Optogenetics *Drosophila* NMJ	Lab 7 due Mar 21
Mar 22-26		Spring break	
Allen Brain Atlas labs and project			
Mar 29	*M*	*Lec 8: Allen brain cell types database (RB)*	
Mar 30 - Apr 2		Lab 8: Defining neuronal cell types	Lab 8 due Apr 4
Apr 5	*M*	*Lec 9: Allen Brain Atlas and intro to project (RB)*	
Apr 6-9		Lab 9: Allen Brain Atlas	Lab 9 due Apr 11
Apr 12	*M*	*Review Labs 4-9 (GSIs)*	
Apr 13	Tu	Exam 2 covers labs 4-9 (no labs Apr 13-14)	Exam 2 Apr 13
Apr 15/16	Th/F	Lab 10: Allen Brain Atlas project	
Apr 19	*M*	*No lecture*	
Apr 20-23	Tu-F	Lab 10: Allen Brain Atlas project	
Apr 26	*M*	*No lecture*	
Apr 27-30	Tu-F	Presentations	Presentations
			Lab 10 **report** due May 9