

MCB 163L: Neuroanatomy Lab, Fall 2017

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 developmental neurobiology, the sensory, motor and limbic systems, as well as aspects of neurochemistry, action potential conduction and neuropathology. These are essential ingredients of a global perspective on modern neuroscience.

Prerequisites: Biology 1A/1AL; MCB 160 (or taken concurrently), MCB 161 recommended

Course instructors

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Course Organization

The course consists of 1 hour of lecture and two 3-hour lab sessions a week.

Lectures are on Mondays 2-3 pm in 101 Barker.

Laboratory sections are all in 4048 VLSB and will be led by Graduate Student Instructors as listed below.

Lab section	Day/Time	GSI	Email
101	Tu/Th 9-12pm	Stefanie Engert	stefanie.engert@berkeley.edu
102	Tu/Th 2-5pm	Althea Cavanaugh	altheacavanaugh@berkeley.edu
104	W/F 2-5pm	Joseph Aman	j.aman@berkeley.edu

Textbook

There is no required textbook, but you will likely need to reference neuroscience textbooks such as:

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

Assignments and grading

Lab notebook	10 %
2 Presentations (5% each)	10 %
3 Lab Reports (10% each)	30 %
Oral exam	10 %
Final exam	40 %

Lab notebook

You are required to bring your lab notebook with you to every lab session. Your notebook should include a summary of the procedures, notes about the experiment, data collected during lab, drawings and images you make during lab, and answers to questions in the lab manual or worksheets. You can find more details about the notebook in the lab manual after the course schedule. GSIs will randomly check lab notebooks throughout the semester, so always bring it and keep up with your work. This will be an invaluable resource when you study for the final exam.

Lab reports and presentations

You will write three lab reports and make two group presentations on your experiments. You will receive further instructions and guidelines for these assignments. The due dates are listed below and in the schedule.

- Lab 9 (frog sciatic nerve) report due Oct 17/18
- Lab 10 presentation Nov 2/3
- Lab 10 (immunohistochemistry) report due Nov 7/8
- Lab 12 presentation Nov 30/Dec 1
- Lab 12 (Allen brain atlas) report due Dec 6

Oral exam

We will give you a list of important questions related to each lab and lecture. You should work on answering these questions when you do the corresponding lab. Instructors will randomly choose students to answer the questions, without notes, in front of the lab section. This means you need to always be ready to explain and discuss the previous questions. You will not be graded on these answers, but we hope you take this initial test run through the questions seriously. Ask the student who is presenting questions and ask your GSI to clarify, so you understand the answers.

On October 31 (happy halloween!) and November 1, there will be an oral exam using those same questions. You will meet with two of the instructors (without other students in the room) who will each ask you one of these questions at random. 10% of your grade will be determined by how well and thoroughly you are able to answer the two questions. This is a good practice for learning how to talk about scientific concepts.

Final exam

The final exam will be Tuesday Dec 12 11:30am-2:30pm. It will cover both lecture and lab material, as well as some of the questions from the oral exam list. The exam will include timed images for identification, short essays, matching, multiple choice and interpretation of data and figures. A more extensive list of questions and topics covered on the final is available at the beginning of the lab manual. Use these questions as a study guide, but also focus on the lecture slides and information in the lab manual.

Missed exams

If you have official school travel that conflicts with the oral exam, you can take the exam early with one of the professors. If you miss the final exam, you will need to apply for an incomplete grade and make it up later.

Attendance and participation

Attendance in laboratory sessions is **required**. A laboratory missed for a documented medical reason can be made up through arrangement with your GSI. More than one missed lab requires a written excuse from a relevant health professional on their letterhead within one week. Labs missed for other than medical or official school function reasons are considered unexcused and cannot be made up. It is not fair to the GSIs to have to arrange make-up labs for students who miss a lab for elective reasons. Official school-related excused absences include trips for music or sports activities or travel for scientific meetings, medical school/grad school interviews, etc. Only one unexcused absence from a lab is permitted. You will lose points from your final grade if you have a subsequent unexcused laboratory absence.

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, homework assignments are to be completed independently and materials submitted as homework 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 a quiz or 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 the quizzes and exams.

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>

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. And we also 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. And 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 work place 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/>.

Date	Day	Lab/Lecture	Assignments
Aug 24/25	Th/F	ATTEND THE FIRST LAB! Introduction to course	
Aug 28	M	Lec 1: Organization of brain (HR)	
Aug 29/30	Tu/W	Lab 1: Introduction to the brain: models, 3D atlas, Brain Explorer, brain MRI activity	
Aug 31/Sep 1	Th/F	Lab 2: Human brain and spinal cord, sheep brain outside structures, cranial nerves	
Sep 5/6	Tu/W	Lab 3.1: Sheep brain (sagittal and horizontal)	
Sep 7/8	Th/F	Lab 3.2: Sheep brain (subcortical)	
Sep 11	M	Lec 2: Vision and auditory (HR)	
Sep 12/13	Tu/W	Lab 4: Eye and vestibular sensory organ anatomy	
Sep 14/15	Th/F	Lab 5: Allen Brain Atlas for visual and auditory pathways	
Sep 18	M	Lec 3: Somatosensory pathways (HR)	
Sep 19/20	Tu/W	Lab 6: EEG	
Sep 21/22	Th/F	Lab 7.1: Neurological exam #1 (sensory), case studies and brainstem slides	
Sep 25	M	Lec 4: Motor pathways (HR)	
Sep 26/27	Tu/W	Lab 7.2: Neurological exam #2 (motor), case studies, spinal cord slides	

Sep 28/29	Th/F	Lab 8: Intro to electrophysiology	
Oct 2	M	Lec 5: Electrophysiology and frog nerve (RB)	
Oct 3/4	Tu/W	Lab 9.1: Frog sciatic nerve	
Oct 5/6	Th/F	Lab 9.2: Frog sciatic nerve	
Oct 9	M	Lec 6: Mouse brain anatomy and neurotransmitters (SL)	
Oct 10/11	Tu/W	Lab 10.1: Day 1 IHC and brain slice activity	
Oct 12/13	Th/F	Lab 10.2: Day 2 IHC and Nissl staining	
Oct 16	M	Lec 7: Imaging (SL)	
Oct 17/18	Tu/W	Lab 10.3: Day 3 IHC mounting slides	Lab 9 report
Oct 19/20	Th/F	Lab 10.4: Day 4 IHC imaging	
Oct 23	M	Lec 8: Axon guidance and motor circuitry (RB)	
Oct 24/25	Tu/W	Lab 11.1: C. elegans DV patterning (behavior testing)	
Oct 26/27	Th/F	Lab 11.2: C. elegans DV patterning (imaging)	
Oct 30	M	GSI review for oral exam	
Oct 31/Nov 1	Tu/W	Oral exam in lab	Oral exam
Nov 2/3	Th/F	Lab 10 group presentations	Lab 10 presentation
Nov 6	M	Lec 9: Connectome and Allen Brain resources (RB)	
Nov 7/8	Tu/W	Lab 12.1: Review Allen Brain Atlas and develop project	Lab 10 report
Nov 9/10	Th/F	NO LAB	
Nov 14/15	Tu/W	Lab 12.2: Allen brain project	
Nov 16/17	Th/F	Lab 12.3: Allen brain project	
Nov 21-24		NO LAB	
Nov 28/29	Tu/W	Lab 12.4: Prepare presentations	
Nov 30/Dec 1	Th/F	Lab 12 group presentations	Lab 12 presentation
Dec 4-8		RRR week review time during lab sections	
Dec 6	W		Lab 12 report
Dec 12	Tu	11:30-2:30 Final exam	Final exam