Syllabus

Professors:

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Meetings: Thursday 1:30-4:30 PM
Location: TRC 11-146AB

Office Hours:
Isabel Muzzio: Monday: 12-2 PM, Solomon Lab D5 or by appointment.
Ted Abel: By appointment

Overview:

This course focuses on the current state of our knowledge about the neurobiological basis of learning and memory. A combination of lectures and discussions will explore the molecular and cellular basis of learning in invertebrates and vertebrates from a behavioral and neural perspective. This course is intended for upper level undergraduates and graduate students.

Prerequisites:

Biology 251 or permission of instructor.

Textbook and Readings:

Readings for this course will be drawn from several textbooks as well as the primary literature. All readings will be posted on the course Blackboard site (https://courseweb.library.upenn.edu/).
It is critical that you do all the reading in timely fashion prior to class. Please consult textbooks and other sources as needed to fully understand the material.

Good sources for background reading include:
Course Format:

This course meets once per week. The first part of the class will be devoted to a lecture that will provide a general overview of the topic to be discussed and the approaches used in these studies. The second part of the class will be devoted to discuss the reading assignments in a debate format. The class will be divided in two groups: A “pro”, and a “con” group. The “pro” group should provide a brief summary of the paper and point out the strengths of the approach, including uniqueness of experimental design and originality of the findings. The “con” group should point out the caveats, limitations and alternative explanations of the findings. After the presentations there will be a brief class discussion during which the best “pro” and “con” arguments are exposed. During this discussion the class should reach a conclusion in favor of one of the groups. This conclusion should be based not only on the arguments presented in class but also on the student’s own opinion of the paper. Students will be evaluated based on their ability to present information, clarity of concepts, critical thinking, and participation. Students are welcome to use power point slides or the blackboard to aid their presentations. During presentations, all students are encouraged to ask questions and/or challenge the points presented by each group. Two or three papers will be presented in each class and each group will have 15-20 min to discuss the points related to each paper. Everyone is expected to participate in every class.

Readings:


Each week pdf files of background reading and papers to be discussed will be posted on the course site on Blackboard. It is mandatory that students read the first two papers of the background reading list each week. The third paper is recommended unless we specify otherwise. All lectures will precede paper discussions. Therefore, assignments for discussion will be given at least one week prior to the presentation. Exam questions will be taken from the list of papers to be discussed, the background readings, discussion in class and the lectures.

Grading:

For UNDERGRADUATES in the class, there will be three components that will be used in determining the grade for this course.

   a. Class participation and presentations (50%): Ask critical questions and participate actively in the discussions
   b. Take home midterm (25%): The questions will be given on September 27th. The exam will be due October 11th.
   c. Final Exam (25%): A take home final exam will be given out at noon (via email) on November 29th. This exam is due at noon (via email) on Dec 14th.

For GRADUATE students in the class, there will be four components that will be used in determining the grade for this course:

   a. Class participation and presentations (50%): Ask critical questions and participate actively in the discussions
   b. Take home midterm (20%): The questions will be emailed on September 27th. The exam will be due October 11th.
   c. Final Exam (20%): A take home final exam will be given out at noon (via email) on November 29th. It is due at noon (via email) on Dec 14th.
   d. For graduate students only: “News and Views” paper (10%): A short (5-7) page paper is due at noon via email on November 20th. The topic and format of this paper is described briefly below.

Midterm and Final Exams

The questions in the midterm and final exams will be essay format and may include additional papers to read and comment on. In many cases there may not be a correct answer; the most important thing is to demonstrate your ability to think about problems in the field of learning and memory. These exams are open book and open notes. You are welcome to refer to any written source, but your answers should not be plagiarized—you should clearly cite sources that you refer to that are not in the syllabus. Although the exam is open book you should not discuss your answers or your ideas with your classmates. All thinking and work must be your own.

Penn’s Code of Academic Integrity (HYPERLINK "http://www.vpul.upenn.edu/osl/acadint.html" http://www.vpul.upenn.edu/osl/acadint.html). You are expected to follow Penn’s Code of Academic Integrity in all of your work at Penn. All work should be your own and the work of others should be properly cited.
“News and Views” Article Assignment - For graduate students only
Due on November 20th

Below are the guidelines for this article. These guidelines are a modification of what Nature sends to “News and Views” authors. We will hand out a sample “News and Views” so that you have an idea of what we are aiming for. (Actually, the sample will be a “Perspective,” which is what Science calls its version of “News and Views.”)

1. These articles inform readers about new scientific advances, as reported in recently published papers. The article should highlight the “news” presented in the research paper, provide the necessary scientific background to place this “news” in context and provide an outline of the future directions of the field. Two or three research papers will be handed out in class on October 14 one month before this assignment is due. Please choose ONE of these papers for your “News and Views.”

2. “News and Views” articles should be within the length limits of 5 to 7 double-spaced typed pages in 12 point Times font (1500-2500 words). Writing a paper this short is a challenge and usually means starting with a paper that is much longer and working to sharpen and focus your arguments through multiple drafts.

3. The “news” should be mentioned in a succinct opening paragraph to attract the attention of those who are not experts in the field. This paragraph should explicitly refer to the paper under discussion and touch on the significance of the new work.

4. More detail, background and explanation should follow, including your own “views.”

5. The article is often best rounded off with comment on the implications of the new work and on future research directions.

6. Most readers will have a general scientific background but specialized terminology should be avoided or clearly and concisely explained.

7. One or two diagrams should be used to explain the new points made or the background science to the new result, or to sketch out the future experiments proposed in the article.

8. References should be kept to a minimum, ideally fewer than ten. They should be cited in Author, Date format as used in the journal Cell. Be sure to include the title for all cited papers as in the reference format in the journal Cell. (Obviously, this is not included in Nature’s advice to authors!)

The topic of this paper will be the idea of “systems consolidation.” At present, there is discrepancy among scientists about whether memories are indeed consolidated at the systems level. This disagreement is based on the fact that evidence in support of this idea is limited. For this assignment, you will have to review the literature about systems consolidation and develop a personal viewpoint about this topic. Then, you will have to find an article that supports your point of view and write a paper according to the “views and news” guidelines.
Lecture Schedule and Readings: The lectures about each topic will precede the paper discussions. Therefore, the papers assigned for discussion will be presented the week following each lecture.

September 6th: Introduction and Aplysia. Lecturer: Ted

Background reading


Primary papers to be discussed on September 13th:


September 13th: Spatial learning in the hippocampal formation. Lecturer: Isabel

Background reading (the three papers are mandatory):


Primary papers to be discussed on September 20th:


**September 20th: Hippocampus: synaptic plasticity and genetic dissections. Lecturer: Ted**

Background reading:


Primary papers to be discussed September 27th:


**September 27th: Amygdala—Emotional Memory. Lecturer: Ted**

Background readings:


Primary papers to be discussed October 4th:


October 4th. Amygdala: Extinction and Reconsolidation. Lecturer: Isabel

Background Readings:


Primary papers to be discussed October 11th:


October 11th: Epigenetics. Lecturer: Ted

Background reading


Papers to be discussed on October 25th:


October 18th. No class SFN

October 25th: Striatum: Habit learning and reward value. Lecturer: Isabel

Background Readings:


Papers to be discussed on November 1st:


November 1st: Sleep and Memory. Lecturer: Ted

Background readings (read all the papers):


Primary papers to be discussed on November 8th:


November 8th. Learning and Memory in the Prefrontal cortex. Lecturer Isabel

Background readings:


Primary papers to be discussed on November 15th:


November 15th. Neurogenesis and learning. Lecturer Isabel

Background readings:


Primary papers to be discussed on November 29th:


November 22nd No class. Thanksgiving break

November 29th. Interactions of Memory systems. Lecturer Isabel


Primary papers to be discussed on December 6th:


December 6th: Last day of classes: Final paper discussion