Biology 442/INSC 575/Psychology 421
Neurobiology of Learning and Memory
Fall Semester 2014
University of Pennsylvania

Syllabus

Professors:

Isabel Muzzio, Ph.D.
Assistant Professor, Department of Psychology
Solomon Lab
imuzzio@sas.upenn.edu

Ted Abel, Ph.D.
Brush Family Professor of Biology
Co-Director, Biological Basis of Behavior Program
Smilow Center for Translational Research, Room 10-133
215-746-1122
abele@sas.upenn.edu
http://www.bio.upenn.edu/faculty/abel/

Meetings: Thursday 1:30-4:30 PM
Location: John Morgan 100

Office Hours:
Isabel Muzzio: 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 undergraduate 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 Canvas site (https://canvas.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 discussing the reading assignments in a debate format. For each class, there will be a list of two background readings and two assigned papers. The students should carefully read the reviews and papers to be able to comment about them during the following class. The discussions of the reviews will focus on the main issues rather than details, specially emphasizing the unresolved questions or the discrepancies in the field. The discussion of the assigned experimental papers will have two stages. During the first stage, students will be randomly called on to explain figures and other details of a paper. This part of the discussion will be aimed at summarizing the findings of the paper and understanding details of the experimental design. During the second part of the discussion, the instructors will call on students to discuss the strengths and weaknesses of the assigned paper. After this debate, there will be a brief class discussion to reach a conclusion about the assigned paper. Students will be evaluated based on their ability to present information, critical thinking, and participation. All students are encouraged to ask questions and/or challenge the points discussed by others. The discussion of each article will take about 30 min. Everyone is expected to participate in every class and in the discussion of every paper. The second part of the class will be devoted to a lecture that will provide a general overview of the topic to be discussed the following week.
Readings:

Each week pdf files of background reading and papers to be discussed will be posted on the course site on Canvas. It is mandatory that students read all the assigned papers. The lectures will focus on the topic assigned for the following week. Assignments for discussion will be given at least one week prior to the presentation. Exam questions will be based on the assigned and background readings, class discussions, and 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 October 2nd. The exam will be due October 16th.
   c. Final Exam (25%): A take home final exam will be given out at noon (via email) on December 4th. This exam is due at noon (via email) on Dec 16th.

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 October 2rd. The exam will be due October 16th.
   c. Final Exam (20%): A take home final exam will be given out at noon (via email) on December 4th. It is due at noon (via email) on Dec 16th.
   d. For graduate students only: “News and Views” paper (10%): A short (5-7) page paper is due at noon via email on November 26th. 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
(http://www.upenn.edu/academicintegrity/ai_codeofacademicintegrity.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 26th.

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.

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. The topic will be assigned 2-3 weeks prior the due date.

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!)
Lecture Schedule and Readings: The lectures about each topic will precede the paper discussions. Therefore, the papers assigned for discussion will be discussed the week following each lecture.

August 28th: Introduction, Aplysia and Drosophila. Lecturer: Ted

Background reading:


Primary papers to be discussed on September 4th:


September 4th: Spatial learning in the hippocampal formation. Lecturer: Isabel

Background reading:


Primary papers to be discussed on September 11th:


September 11th: Hippocampus: synaptic plasticity and genetic dissections. Lecturer: Ted

Background reading:


Primary papers to be discussed September 18th:


September 18th: Amygdala—Emotional Memory. Lecturer: Ted

Background readings:


Primary papers to be discussed September 25th:


September 25th. Amygdala: Extinction and Reconsolidation. Lecturer: Isabel

Background Readings:


Primary papers to be discussed October 2nd:


**October 2nd: Epigenetics. Lecturer: Ted**

Background reading


Papers to be discussed on October 16th:


**October 9th: No Class Fall break**

**October 16th: Sleep and Memory. Lecturer: Isabel**

Background readings (read all the papers):


Primary papers to be discussed on October 23rd:


**October 23rd**: Learning and Memory in the Prefrontal cortex and beyond. Lecturer Isabel  

Background readings:  


Primary papers to be discussed on October 30th:  


**October 30th**: Memory maintenance and systems consolidation. Lecturer Isabel  

Background readings:  


Primary papers to be discussed on November 6th:  


**November 6th**: Interactions of Memory systems. Lecturer Isabel.  

Background readings:  


Primary papers to be discussed on November 20th:


November 13th No class SFN

November 20th. Neurogenesis and learning. Lecturer Isabel
Background readings:


Primary papers to be discussed on November 25th:


November 25th: Tuesday corresponding to Thursday class schedule. NO CLASS Thanksgiving break

December 4th: Final discussion: Aging and learning and memory. Lecturer Isabel.

Background readings:


Primary papers to be discussed on December 5th: If there is no time for discussing these papers I will give an overview of the main findings