



PSYC1150 Memory and the Brain

SYLLABUS FOR SPRING 2013 (updated February 10, 2013)

Instructor: Rebecca D. Burwell, Ph.D.
Metcalf, Rm 337
rebecca_burwell@brown.edu

Office Hours: By appointment

Course Time and Place: T-Th 2:30-3:50, Metcalf 330

Note for Spring 2013: Normally, this class will be taught as a lecture course. Given that it is the first semester and enrollments are low, for Spring 2013 only, the course will be taught as a seminar course.

Overview of the Course: This class is for undergraduate and beginning graduate students of psychology, cognitive neuroscience, and biology who are interested in an introduction to biological research on memory. The course is divided into four parts: 1) how neurons are connected and communicate, 2) fundamental issues in the psychology of memory, 3) memory localization in the brain, and 4) consolidation of memory into a permanent store. The course is designed to be accessible to students in a variety of disciplines, but requires some background in psychology, cognitive science, or neuroscience. The class will include lecture, writing assignments, and presentations of primary research articles. Prerequisite: CLPS 0010, 0020, 0040, 0200, or NEUR 0010.

Textbook: The Cognitive Neuroscience of Memory: An introduction, Second Edition, by Howard Eichenbaum, 2011, Oxford University Press. Text is available in the Brown Bookstore or on Kindle.

Objective: The purpose is to gain background in the cognitive neuroscience of memory. Normally, this course will be taught as a lecture course. In Spring 2013, however, we will conduct the course as a seminar because the small enrollment allows.

Workload:

Reading will be one chapter and 2-3 research articles per week depending on the length and complexity. Prior to classes in which chapters will be discussed, submit:

- One to 1.5 page answers to the study questions at the beginning of the chapter
- One multiple choice or fill in the blank question on the chapter.

Prior to classes in which research articles will be presented and discussed, submit:

- one question or comment for discussion per assigned paper
- one multiple choice or fill in the blank question on the chapter

Students will be expected to present 2 research articles during the semester.

There will also be a paper in the second half of the semester. Details to be determined.

Grading will be based on presentation of research articles (30%), participation in class (20%), written assignments (20%), and final paper (30%).

CLPS1150, Spring 2013, Concentration credit:

Psychology ScB and AB: counts as a seminar and as a Comp/Physio course

Cognitive Science: counts as an elective

Cognitive Neuroscience: can count as an elective or a capstone for seniors if not taking an independent study or the cognitive science seminar (the normal capstone requirement).

Neuroscience: Spring 2013 will count as a critical readings course. Thereafter, will be an elective.

CLPS1150 2013 Schedule

Format: In general Tuesdays will be set aside for discussion of the assigned chapter and Thursdays will be set aside for detailed presentation and discussion of research papers. Chapters are from *The Cognitive Neuroscience of Memory: An introduction, Second Edition*, by Howard Eichenbaum. Research papers will be assigned a week ahead of time.

Week of January 28

Tues: Chapter 1. Introduction: Four themes in research on the neurobiology of memory, 1

Thurs: Historical papers.

McGaugh, J.L. 2000. Memory – a century of consolidation. *Science* 287:248–251.

Milner, B., Squire, L.R., and Kandel, E.R. 1998. Cognitive neuroscience and the study of memory. *Neuron* 20:445–468.

Tolman, E.C. 1948. Cognitive maps in rats and men. *Psychological Reviews* 55:189–208.

Optional Reading:

Polster, M.R., Nadel, L., and Schacter, D.L. 1991. Cognitive neuroscience analyses of memory: A historical perspective. *Journal of Cognitive Neuroscience* 3:95–116.

SECTION I. Connection, The cellular and molecular bases of memory

Week of February 4

Tues: Chapter 2. Neurons and simple memory circuits, 29

Thurs: Research papers

Carew, T.J. 1996. Molecular enhancement of memory formation. *Neuron* 16:5–8.

Bourtchuladze R, Frenguelli B, Blendy J, Cioffi D, Schutz G, Silva AJ. Deficient long-term memory in mice with a targeted mutation of the cAMP-responsive element-binding protein.

Cell. 1994 Oct 7;79(1):59-68.

Week of February 11

Tues: Chapter 3. Cellular mechanisms of memory: Complex circuits, 51

Malenka RC, Bear MF. 2004. LTP and LTD: an embarrassment of riches. *Neuron* 44(1):5-21.

Thurs: Papers for presentation

- Kemp A, Manahan-Vaughan D. 2004. Hippocampal long-term depression and long-term potentiation encode different aspects of novelty acquisition. *Proceedings of the National Academy of Sciences of the United States of America* 101(21):8192-7.
- Whitlock JR, Heynen AJ, Shuler MG, Bear MF. 2006. Learning induces long-term potentiation in the hippocampus. *Science* 313(5790):1093-7.

SECTION II. Cognition: Is there a “cognitive” basis for memory?

Week of February 18

Tues: University long weekend, no class

Thurs: Chapter 4. Amnesia – learning about memory from memory loss, 85

Week of February 25

Tues: Chapter 5. Exploring declarative memory using animal models, 111

Thurs: Research papers, TBD

Week of March 4

Tues: Chapter 6. Windows into the workings of memory, 149

Thurs: Research papers, TBD

SECTION III. Compartmentalization: Cortical modules and multiple memory systems

Week of March 11

Tues: Chapter 7. The cerebral cortex and memory, 197

Thurs: Research papers, TBD

Week of March 18

Tues: Chapter 8. Multiple memory systems in the brain, 219

Thurs: Research papers, TBD

Mar 23-March 31: Spring Recess, no class

Week of April 1

Tues: Chapter 9. A brain system for declarative memory, 235

Thurs: Research papers, TBD

Week of April 8

Tues: Chapter 10. A brain system for procedural memory, 267

Thurs: Research papers, TBD

Week of April 15

Tues: Chapter 11. A brain system for emotional memory, 291
Thurs: Research papers, TBD

SECTION IV. Consolidation: The fixation and reorganization of memories

Week of April 22

Tues: Chapter 12. Two distinct stages of memory consolidation, 317
Thurs: Research papers, TBD

Week of April 29

Tues: Chapter 13. Working with memory, 351
Thurs: Research papers, TBD