

**PSY 410**  
**Neurobiology of Learning and Memory**  
**Fall Semester 2010**  
**306 Old Horticulture**  
**T Th 10:20-11:40**

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**Course Description and Objectives:** This is an advanced course focusing on current findings on the neurobiological basis of learning and memory. Based on lectures, discussions, and student presentation, learning and memory will be analyzed at the molecular, cellular, circuitry, systems and behavioral levels in invertebrates and vertebrates. We will cover strategies used to study the neural basis of learning and memory and explore current topics in memory research in humans and animals. This overview will include learning how to read and critique primary research articles and how to write a research proposal. Students should have a basic background in neuroscience (ZOL 402) or brain and behavior (PSY 209) and statistics/experimental design (PSY 295).

**This class also fulfills the Tier II writing requirement.** Students are expected to develop writing skills consistent with the discipline. Completion of Tier I writing requirement is required. This course will progress from lectures based on the fundamental neurobiology of learning and memory, to discussion and then student led presentations of research findings based on the primary neuroscience literature.

**Required Textbook:** Learning and Memory  
Howard Eichenbaum  
Norton Press, 2008

Also additional background reading from relevant chapters in any of the following books:

- **An Introduction to Brain and Behavior, Kolb and Wishaw**
- **Physiology of Behavior, Carlson**
- **Biological Psychology, Kalat**
- **Biopsychology, Pinel**
- **Biological Psychology, Rosenzweig**

**Recommended for scientific writing:**

- **The Craft of Scientific Writing, Alley**

## Course Requirements:

- **Each exam will consist of short answer essay items. Exams I (October 12), II (November 11) and III (December 9)** will cover the material from each individual section of the course.
- **Article discussion.** 5 research articles are assigned for group discussion. Read and be ready to discuss the details of the article. Be sure to know: methods, results and be able to relate the findings to the current lecture topic. For each article, complete the assigned worksheet. The form is available on Angel. The worksheet is due on the article discussion date. **Late papers will be penalized by a grade drop for each late day.**
- **Research Highlights: This is a group assignment.** There will be 4 or 5 group presentations, depending of the size of the class. Each one will be based on a current research theme in the field of cognitive neuroscience. Each group will receive from the instructor a general review article or published commentary and a recent related research article. Students will choose to further research this topic area. Class time will be devoted to individual group discussions to prepare group presentations of the research highlights to the class. This effort will culminate in a group presentation of the current status of this research area. **More details for this assignment will be provided at the end of Unit I.**
- **Poster presentations.** Each student will select a journal article from the primary literature. The article must be approved by the instructor. The goal of this assignment is to explain and critically evaluate primary research results. Book chapters, reviews, commentary or websites are not appropriate sources. Detailed information on the poster requirements will follow Unit 1. A **summary critique** of the article is due at the time of the poster presentation. Each student is also required to visit the posters and prepare a written critique of 4 posters.
- **Research Proposal** will consist of 3 sections. The **first** section will be a description of two research articles published since 2001 and related to each other and to your research highlight theme. One of these two articles will be used for your **Poster** presentation. The **second** section will be a description of how the data provided by these two papers influence our understanding of the mechanisms of learning and memory. Relate the findings to the theoretical issues raised in the course. The **third** and final section will be a short research proposal. Design a series of experiments to test the hypotheses generated from the research problem that represent the logical next step as defined by the two selected articles and the Hot Topic discussion. More details for this assignment will be provided at the end of Unit I. Note: Papers are due in class 12/7. **Late papers will be penalized by a grade drop for each late day.**

**Draft** represents the first step in preparing the Term Paper. The students will submit a first draft of the sentence outline with references for a preliminary review by the instructor. This should include the rough draft of each section of the proposal. This draft will be returned to you with comments. The proposal grade based on the final paper will reflect the comments and suggestions of the draft review.

**Grading:**

Exam 1- 15%

Exam 2- 15%

Exam 3- 15%

Research Highlights Group Oral Presentation: 15%

Research article poster presentation, summary and 4 critiques: 15%

Research proposal (paper): 15%

Class participation and 1 page article commentary (5): 10%

Final grades will be based on the following point distribution:

<b>% points received</b>	<b>grade</b>
90-100	4.0
85-89	3.5
80-84	3.0
75-79	2.5
70-74	2.0
65-69	1.5
60-64	1.0
less than 60	0.0

*Academic Honesty:* Article [2.3.3](#) of the [Academic Freedom Report](#) states that "The student shares with the faculty the responsibility for maintaining the integrity of scholarship, grades, and professional standards." In addition, the Department of Psychology adheres to the policies on academic honesty as specified in General Student Regulations 1.0, *Protection of Scholarship and Grades*; the all-University Policy on *Integrity of Scholarship and Grades*; and Ordinance 17.00, *Examinations*. (See *Spartan Life: Student Handbook and Resource Guide* (<http://www.vps.msu.edu/SpLife/index.htm>) and/or the MSU Web site: <http://www.msu.edu>). Therefore, unless authorized by your instructor, you are expected to complete all course assignments, including homework, lab work, quizzes, tests and exams, without assistance from any source. You are not authorized to use the [www.allmsu.com](http://www.allmsu.com) Web site to complete any course work in Psy 410. Students who violate MSU rules may receive a penalty grade, including but not limited to a failing grade on the assignment or in the course. Cheating will be taken very seriously and any student that violates MSU rules (i.e. is caught cheating on any assignment) will be given a failing grade for the class and the case will be brought to the attention of the Psychology Department advisors who may take further action.

*Accommodations for Disabilities:* Students with disabilities should contact the Resource Center for Persons with Disabilities to establish reasonable accommodations. For an appointment with a counselor, call 353-9642 (voice) or 355-1293 (TTY).

*Drops and Adds:* The last day to add this course is the end of the first week of classes. The last day to drop this course with a 100 percent refund and no grade reported is 9/27/2010. The last day to drop this course with no refund and no grade reported is 10/20/2010. You should immediately make a copy of your amended schedule to verify you have added or dropped this course.

*Observing a Major Religious Holiday:* You may make up course work missed to observe a major religious holiday only if you make arrangements in advance with the instructor.

*Participation in a Required Activity:* To make up course work missed to participate in a required activity for another course or a university-sanctioned event, you must provide the instructor with adequate advanced notice and a written authorization from the faculty member of the other course or from a university administrator.

*Commercialized Lecture Notes:* Commercialization of lecture notes and university-provided course materials is not permitted in this course.

*Attendance:* Students whose names do not appear on the official class list for this course may not attend this class. In order to succeed in this course, class attendance is necessary. A sign-in sheet is distributed each class day.

*Disruptive Behavior:* Article 2.3.5 of the *Academic Freedom Report* (AFR) (<http://www.vps.msu.edu/SpLife/acfree.htm>) for students at Michigan State University states that "The student's behavior in the classroom shall be conducive to the teaching and learning process for all concerned." Article 2.3.10 of the AFR states that "The student has a right to scholarly relationships with faculty based on mutual trust and civility." General Student Regulation 5.02 states that "no student shall . . . interfere with the functions and services of the University (for example, but not limited to, classes . . .) such that the function or service is obstructed or disrupted. Students whose conduct adversely affects the learning environment in this classroom may be subject to disciplinary action through the Student Faculty Judiciary process.

*Missed exams:*

If you know that you cannot make it to an exam bring that to my attention at least a week before the exam so that I can determine whether an opportunity for a make-up will be provided. A note from a doctor or other documentation of extreme circumstances (e.g. hospitalization, death of immediate relative) that will makes it impossible to take the exam is required. The make-up exam is an alternate essay exam.

*Other issues:*

Please be aware that it is against University policy for a professor to give any one student a special opportunity that is not provided to all students.

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**Neurobiology of Learning and Memory**  
**Topics and Dates**

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**Unit 1**

**9/2-10/12**

Introduction & historical background	Ch 1
Methods used to study mechanisms of learning and memory	Ch 1/ 2
Cellular Mechanisms	Ch 2
Simple circuits	Ch 3
Perceptual Learning and Memory	Ch 4
Procedural learning and Memory	Ch 5-6

<b>10/12</b>	<b>EXAM I</b>
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**Unit II**

**10/12-11/11**

Emotional learning and memory	Ch 7
Cognitive memory	Ch 8
Episodic memory	Ch 9
Semantic memory	Ch 10
Memory consolidation	Ch 11
STM and Working memory	Ch 12
Research Highlight group preparation	

<b>10/14</b>	<b>Research Highlight Selections</b>
<b>10/19</b>	<b>Poster Article Selections</b>
<b>11/11</b>	<b>EXAM II</b>

**Unit III**

**11/11-12/9**

<b>11/16</b>	<b>First Draft Due in class</b>
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Poster presentations  
Research Highlight group preparation  
Research Highlight group presentations

<b>12/7</b>	<b>Research Proposal Due in class</b>
<b>12/9</b>	<b>EXAM III</b>