Selected Topics in Behavioral Neuroscience

The Neurobiology of Learning & Memory
(PSYC 222)
Fall 2010

**Instructor**
Matthew Campolattaro, PhD
Dewey Hall 331
Office Hours: Fridays 3:30pm-5:30pm
Office Phone: 656-8029
E-mail: mmcampo@gmail.com

**Meeting Time & Location**
MW, 4:05-5:20pm
Dewey Hall 100

**Prerequisites**
Biopsychology (PSYC 121) and/or Physiological Psychology (PSYC 221)

**Course Summary**
This course will survey the fundamental concepts, facts and methodologies for examining how the brain learns and remembers information. Discussion will center on the molecular-, cellular- and neurobiological systems-level approaches that are used to investigate memory formation, retention and expression. Memory neuropathology will often be discussed.

**General Structure of the Class**
Lectures will cover important topics in the textbook, including concepts and key experiments, and will I add supplementary information. On selected days throughout the semester students will present supplementary readings as well as (time permitting) delving further into important concepts. My role will be to guide and shape the discussion, but I expect students to take an active role in posing and (hopefully) answering questions.

**Blackboard Information**
I will be using Blackboard to manage the course. The syllabus and basic information regarding the semester plan will be available online. In addition, the supplemental readings (i.e., Handouts and Articles) will be available. PowerPoint overheads will be made available the evening before each lecture.

**Textbook**

**Handouts: TBA** *(will be made available on the class website)*

Handout 1:
Handout 2:
Handout 3:
Empirical/Review Articles (will be made available on the class website)

Round One (Sep 27)


Round Two (Oct 25): TBA
1. Hippocampus place cells
2. Hippocampus role in EBC
3. Hippocampus in bird song learning (Taxi Drivers)

Round Three (Dec 1): TBA
1. Schizophrenia, fear paper
2. Monkey recording from motor cortex
3. Human Cognitive Neuroscience, neocortical processing

Exams
Exam format generally will be multiple-choice and short answer. Exams will cover lectures, assigned readings (i.e., Textbook and Handouts), and student presentations. Exams are not cumulative in content per se, but are cumulative conceptually. Make-up exams must be arranged with the instructor at least 48 hours prior to the exam. In the event of an illness, make-up exams will be administered only if a medical excuse is provided by the Dean’s office. If you have a medical condition that may interfere with taking an exam sometime in the semester, you must contact me in the first week of class to discuss it.

Empirical/Review Article Presentations and Written Summaries
You will be required to do one presentation and two written summaries during the semester. Note: A written article summary is not due the day that you present in class. In other words, a written summary is due the day you do not present in class. Please let me know if this is unclear.

Criteria for Presentations: On selected days throughout the semester, students will present the supplemental reading for that week and field questions from me and the class. These presentations should be made in Powerpoint format and sent to me 24 hours prior to class. Two to three students will sign up to present an article together, depending on enrollment. Presentations should be about 20 minutes, including a 5 minute period for questions.
Presentations need to include the following:
(1) Summary of the main concept(s) or reason for doing the study.
(2) The hypothesis (or hypotheses) of the research?
(3) Description of the methods used and results produced (focus on the purpose of particular methods, rather than every detail).
(4) How the results relate to the main concept(s) and hypothesis/hypotheses of the study?
(5) Potential limitations or shortcomings of the study.
(6) Critical review/opinion about the study.

Your Powerpoint presentation should be 10-15 slides. Do not copy and paste long passages out the article! Make sure to define terminology that your audience might not be familiar with. If you are not presenting, please be prepared to discuss the article. See me if you are struggling with understanding an article.

Points (out of 40 points total) will be awarded based on the following criteria:
1. Quality and organization of Powerpoint slides – 15 pts (less text, more figures is preferable!)
2. Understanding of the paper – 15 pts
3. Study limits and critical review – 10 pts

Criteria for Writing Article Summary: Submit a 2-3 page (1” margins, 12 pt font, double-spaced) written summary of one article of your choice selected from each round of papers. Summaries need to be handed in the day of presentations at the beginning of class (do not email me a copy). Every day late will be penalized 5 points. See me if you are struggling with understanding an article.

Written summaries need to include the following:
(1) Summary of the main concept(s) or reason for doing the study in your own words.
(2) What was the hypothesis (or hypotheses) of the study?
(3) Describe the methods used and results produced (focus on the purpose of particular methods, rather than every detail).
(4) How do the results relate to the main concept(s) and hypothesis/hypotheses of the study?
(5) Discuss any potential limitations or shortcomings about the study.
(6) Pose at least two discussion points for the class.

Points (out of 20 points total) will be awarded based on the following criteria:
1. Quality and clarity of your summary – 5 pts
2. Understanding of the paper – 10 pts
3. Thoughtfulness/originality of discussion points– 5 pts

Course Grading
Exam 1 - 20%
Exam 2 - 20%
Exam 3 - 20%
Article presentation - 15%
Article summaries - 15%
Class attendance and participation - 10%

**Attendance and Class Etiquette**
Attendance of lectures is highly encouraged, since I will often discuss material that is not in the textbook. Please turn cell phones off or to silent mode and do not use text messaging or email during class.

**Student Learning Accommodations**
If you have a formal accommodation plan developed in conjunction with UVM’s ACCESS Office or would like to discuss the supports that you need in order to learn well in this class, please contact me in the beginning of the semester. Adaptations and instructional supports are available through consultation with the instructor and the ACCESS Office.

ACCESS Office: [www.uvm.edu/~access/](http://www.uvm.edu/~access/)

UVM’s policy on disability certification and student support: [www.uvm.edu/~uvmppg/ppg/student/disability.pdf](http://www.uvm.edu/~uvmppg/ppg/student/disability.pdf)

**Religious Holidays**
Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time.

**Academic Integrity**
The policy addresses plagiarism, fabrication, collusion, and cheating.
[www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf](http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf)

**Grade Appeals**
If you would like to contest a grade, please follow the procedures outlined in this policy:
[www.uvm.edu/~uvmppg/ppg/student/gradeappeals.pdf](http://www.uvm.edu/~uvmppg/ppg/student/gradeappeals.pdf)

**Grading**
For information on grading and GPA calculation, go to [www.uvm.edu/academics/catalogue](http://www.uvm.edu/academics/catalogue) and click on Policies for an A-Z listing.

**Code of Student Rights and Responsibilities**
[www.uvm.edu/~uvmppg/ppg/student/studentcode.pdf](http://www.uvm.edu/~uvmppg/ppg/student/studentcode.pdf)

**FERPA Rights Disclosure**
The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy
Final exam policy
The University final exam policy outlines expectations during final exams and explains timing and process of examination period. www.uvm.edu/academics/catalogue2007-08/?Page=allpolicies.php&SM=policymenu.html&policy=Examinations

## Class Schedule

*Every effort will be made to stay on schedule*

<table>
<thead>
<tr>
<th>Week</th>
<th>Dates</th>
<th>Topics</th>
<th>Readings</th>
<th>Assignments</th>
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<tbody>
<tr>
<td>1</td>
<td>Aug 30</td>
<td>Course Introduction and Overview</td>
<td>None</td>
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<tr>
<td></td>
<td>Sep 1</td>
<td>Foundations and Fundamentals</td>
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<td>Chapter 1</td>
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<td>Sep 6</td>
<td>No Class: Labor Day!</td>
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<td>Sep 8</td>
<td>Synaptic Plasticity</td>
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<td>Chapter 2</td>
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<td>Sep 13</td>
<td>Long-Term Potentiation (LTP)</td>
<td>Chapter 2</td>
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<td></td>
<td>Sep 15</td>
<td>Strengthening the Synapse I</td>
<td>Chapter 3</td>
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<td>Sep 20</td>
<td>Strengthening the Synapse II</td>
<td>Chapter 4</td>
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<td>Sep 22</td>
<td>Calcium Signaling</td>
<td>Chapter 5</td>
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<td>5</td>
<td>Sep 27</td>
<td>Presentations (Round One)</td>
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<td>Sep 29</td>
<td>Dendritic Spines</td>
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<td><em>Article Summary Due</em></td>
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<td>Oct 4</td>
<td>Exam I</td>
<td>None</td>
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<td></td>
<td>Oct 6</td>
<td>Studying Memory in Animals and Humans</td>
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<td>Chapter 6</td>
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<td>Oct 11</td>
<td>Biological Basis of Memory Formation</td>
<td>Chapter 8</td>
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<td>Oct 13</td>
<td>Memory Consolidation</td>
<td>Chapter 9</td>
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<td>Oct 18</td>
<td>Memory Modulation</td>
<td>Chapter 10</td>
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<td>Oct 20</td>
<td>Memory Retrieval</td>
<td>Chapter 11</td>
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<td>Oct 25</td>
<td>Presentations (Round Two)</td>
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<td>Oct 27</td>
<td>Hippocampal-Dependent Memory I</td>
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<td><em>Article Summary Due</em></td>
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<td>Nov 1</td>
<td>Hippocampal-Dependent Memory II</td>
<td>Chapter 12</td>
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<td>Nov 3</td>
<td><strong>Exam II</strong></td>
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<td>Nov 8</td>
<td>Neocortical Processing</td>
<td>Handout 1</td>
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<td>Nov 10</td>
<td>Emotional Learning: Pain</td>
<td>Chapter 16 &amp; Handout 2</td>
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<td>Nov 15</td>
<td>Emotional Learning: Pleasure</td>
<td>Chapter 16 &amp; Handout 3</td>
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<td>Nov 17</td>
<td>Motor and Habit Learning</td>
<td>Chapter 15 &amp; Handout 4</td>
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<td>Nov 22</td>
<td>No Class: Thanksgiving Recess!</td>
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<td>Nov 24</td>
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<td>14</td>
<td>Nov 29</td>
<td>Memory Disorders and Treatment</td>
<td>Handout 5</td>
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<td>Dec 1</td>
<td><strong>Presentations (Round Three)</strong></td>
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<td><em>Article Summary Due</em></td>
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<td>Dec 6</td>
<td>Development of Learning</td>
<td>Handout 6</td>
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<td>Dec 8</td>
<td>Course Wrap-up and Review</td>
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**FINAL EXAM ( = Exam III): Dec 11 (Saturday), 4:30pm-7:15pm in Dewey 100**