Psych 3FA3: Neurobiology of Learning and Memory
(2005-2006, Term 1)

Instructor:  
Dr. Hongjin Sun, email: sunhong@mcmaster.ca  
Office: PC415, Tel 905-525-9140, ext 24367

Tutorial Leaders:
Mr. Chris Gilbert, email: iamchrisgilbert@hotmail.com, Office: PC320 ext. 24832  
Mr. Arindam (Andy) Bhattacharjee, email: bhatta4@mcmaster.ca, Office, PC119, ex27114

Weekly Schedule:
Monday, 10:30-11:20 (T28 - lecture or presentation, or PC - group discussion)  
Wednesday, 10:30-11:20 (T28 - lecture or presentation, or PC - group discussion)  
Thursday, 10:30-11:20 (T28, Lecture, midterm exam)  
The group discussion will be held in one of those psychology meeting rooms including  
204, 311, 316, 205A and 205B. Exact room varies depending on the group.

Virtual Classroom
http://www.learnlink.mcmaster.ca

Course Description
This course will explore empirical and theoretical accounts surrounding the neural basis of  
learning and memory. Neural mechanisms will be discussed from several perspectives ranging  
from cognitive neuroscience to synaptic physiology. Students will attain some understanding of  
the rationale and methodology of a variety of strategies that are used in the investigation of the  
nervous mechanisms underlying learning and memory. The course will start with a historical  
perspective and an overview of the multiple memory systems. This model emphasizes the fact that  
memory is composed of multiple, separable systems that are associated with specific  
neurobiological substrates. A number of brain mechanisms subserving learning and memory at the  
systems level, cellular level, and molecular level will subsequently be discussed.

The lectures, required and supplementary readings, in conjunction with student  
discussion/presentations, are meant to provide students with both an overview of some of the  
currently "hot" areas in the field as well as some basic tools useful for research in this field.  
Moreover, students are expected, through active learning (discussions, presentations, and written  
critiques), to gain experience in critically evaluating research literature and in communicating  
ideas through written and oral presentations.

During the first three weeks, introductory material will be covered in a traditional lecture  
format. In subsequent weeks, for each of the 9 major topic areas (modules), introductory lectures  
will be given by the instructor, combined with one hour of student group discussions, and one hour  
of class presentations/discussions.

Reading Materials
Required readings (available in Campus Bookstore):

  University Press.
- Psychology 3FA3 courseware

Background readings
Supplementary readings

Evaluation

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<tr>
<th></th>
<th>Marked by</th>
<th>Performance %</th>
<th>Total %</th>
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<tbody>
<tr>
<td>WORK AS A GROUP</td>
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<tr>
<td>Group Discussion Notes</td>
<td>TAs</td>
<td>8</td>
<td>8</td>
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<tr>
<td>Presentation</td>
<td>Instructor/TAs/Peers</td>
<td>15</td>
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<tr>
<td>WORK AS AN INDIVIDUAL</td>
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<tr>
<td>Written Critiques (Total 2)</td>
<td>TAs</td>
<td>10</td>
<td>20</td>
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<td></td>
<td>TAs</td>
<td>10</td>
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<td>Participation</td>
<td>Peers</td>
<td>8</td>
<td>12</td>
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<td></td>
<td>Within group</td>
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<td>Instructor/TAs</td>
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<td></td>
<td>In class/group</td>
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<td>Written Exam</td>
<td>Midterm</td>
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<td>45</td>
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<td>Final</td>
<td>TAs</td>
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Overall Requirements
The course includes three learning formats:

- Lectures
- Reading
- Discussions/Presentations/Critiques

Lectures
In the first 3 weeks, the lectures will take place every class. Subsequently, lectures will take place only on Thursdays (with the exception of Oct 12). All lectures will be held in T28.

Readings
- The textbook by Eichenbaum will provide background information for the lectures. Some other supplementary reading materials will also be recommended.
- The required readings provided in the courseware are organized into 9 topic modules (see page 5 for a list/schedule). For each module, students will be required to read:
  a) One review paper,
  b) One or two empirical papers, and
  c) A written commentary based on the empirical papers (for most modules).

Discussion/Presentations/Critiques
Students will work in groups of 5-6. Starting from week 4, classes on Mondays and Wednesdays will be reserved for group discussions (PC) and class presentations by the group (T28).

- **Discussions**: Once a week, for one hour, each group will discuss the empirical papers listed for that week’s module. At the end of the one-hour discussion, the group will be required to hand in a written summary of the issues discussed.
- **Presentations**: Each group will be assigned one of the 9 modules for which they will be responsible for giving a formal presentation of the empirical papers to the class.
• **Critiques:** Each student will be required to write critiques for any 2 of the 9 modules (but not the one they are presenting). The content of the critiques can be discussed in groups; however, the critiques must be written individually, **not** as a group.

Half of the class will hold their group discussions on Monday and their presentations on Wednesday; the other half of the class will have the opposite schedule (i.e., presentation on Monday and group discussion on Wednesday). See below for a complete schedule of which groups will be responsible for PRESENTING which modules.

<table>
<thead>
<tr>
<th>Module #</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discussion on Monday</td>
<td>Presentation on Wednesday</td>
<td>group #</td>
<td>A1</td>
<td>A2</td>
<td>A3</td>
<td>A4</td>
<td>A5</td>
<td>A6</td>
<td>A7</td>
</tr>
<tr>
<td>Discussion on Wednesday</td>
<td>Presentation on Monday</td>
<td>group #</td>
<td>B1</td>
<td>B2</td>
<td>B3</td>
<td>B4</td>
<td>B5</td>
<td>B6</td>
<td>B7</td>
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**Detailed Requirements**

**Presentations**
- The group discussion and in-class presentation should be based on the empirical papers listed in each module.
- The first part of the presentation should include the basic findings (20-25 minutes).
- In the second part of the presentation, the presenters should make comments on the papers (10-15 minutes) and explore the broader issues related to the papers. For the issues to be addressed, groups may follow the guidelines for writing the later part of a critique.
- Each group may elect a few members to give the presentation in class but all group members must participate in the preparation of the presentations and the answering of questions during/following the presentation.
- Oral presentations will be graded by class as well as by the instructor, based on the content delivered, the logical flow of ideas, and the presentation style.
- The presentations should incorporate proper audiovisual aids (e.g., Powerpoint slides) and handouts if necessary. The final version of the presentation slides should be sent to the instructor electronically the day of the presentation (preferably before the presentation). This will enable the instructor to post the materials on web for other students to preview/review.

**Critiques**
- For 2 of the 9 modules (NOT the module they are responsible for presenting), students are expected to write a critique based on all empirical papers listed for that module. Students will be given the opportunity to write **three** critiques, in which case, the two critiques with the highest marks will be included in the final grade.
- The critique is due at the beginning of class the day of the week that is designated for presentations (Monday or Tuesday). Late critiques will not be accepted.
- See separate sheet below for detailed instructions for the suggested content of the critique.

**Participation graded for within group performance by peer group members**
- At the end of the term, each member will be required to hand in a written evaluation of the contributions of each of their group members.
• Both, grades (in terms of %) and a written justification should be provided for ALL aspects of participation (e.g. including intellectual contribution and contribution of time and effort, etc).
• Typically, all group members will be given the same grade for the discussion note and presentation, however the instructor reserves the right to factor-in peer evaluations, and may adjust the presentation marks for certain individuals accordingly (e.g., those who contribute very little to the joint effort).

**Participation graded by instructor/TAs:**
Participation grades will be assigned based on the student's performance in the following aspects:
• Attendance in class and at group meetings and **punctuality**
• Active learning
  o Contributions to class and group discussions
  o Contributions to LearnLink discussions
  o Contributions to literature search (students are encouraged to share suitable articles with the group and class, possibly through LearnLink)
  o Showing initiative in organizing group activities
• Providing extensive and informative feedback to other students on their oral presentation, by completing a very brief evaluation form at the end of each presentation
• Providing feedback and suggestions to the teaching of this course (e-mail to the instructor)

**Exams**
The written exams (closed book) will cover lecture and required readings materials. Midterm tests can only be written at the times indicated. There will be no make-up tests or special sessions for any student. Students with valid reasons for missing a midterm test must consult the Dean of Studies office for their faculty (e.g. Science or Social Science). If (and only if) there is adequate written justification for missing the test, such students will have their grades proportionately re-weighted, increasing the relative contribution of the other portion of the grades. The exams will consist of short answer and essay questions.

Final grades will be assigned according to the following conventional scheme:

<table>
<thead>
<tr>
<th>90-100</th>
<th>85-89</th>
<th>80-84</th>
<th>77-79</th>
<th>73-76</th>
<th>70-72</th>
<th>67-69</th>
<th>63-66</th>
<th>60-62</th>
<th>57-59</th>
<th>53-56</th>
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<tbody>
<tr>
<td>A+</td>
<td>A</td>
<td>A-</td>
<td>B+</td>
<td>B</td>
<td>B-</td>
<td>C+</td>
<td>C</td>
<td>C-</td>
<td>D+</td>
<td>D</td>
<td>D-</td>
<td>F</td>
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The instructor reserves the right to adjust final marks up or down, on an individual basis, in light of special circumstances and/or the individual's overall performance in the course.

**Message from the Chair of Psychology**
The instructor cannot be responsible for returning long distance calls from students. Any student wishing to reach an instructor is invited to e-mail the instructor.

**Policy Reminder**
Attention is drawn to the *Statement on Academic Ethics* and the *Senate Resolutions on Academic Dishonesty* as found in the Senate Policy Statements distributed at registration and available in the Senate Office. Any student who infringes one of these resolutions will be treated according to the published policy.
Guidelines for Psych 3FA3 Critiques

The goal of writing a critique is to allow students to attain a deeper understanding of some of the major issues with the topic of the neurobiology of learning and memory and to provide experience in critically evaluating primary source materials in scientific literature.

Each critique must be written in APA style, typed in 12-point font, and the length should be no more than 2 double-spaced pages with 1-inch margins, excluding references. Papers that do not meet these criteria will not be accepted.

Generally, the critique should accomplish two things. First it should try to summarize the important message delivered in the article (half to one page). Second, it should include a discussion of the theoretical implications and their relation to the broader literature.

1. The summary section might include short discussions of:
   a. the research issue addressed in the article
   b. the experimental method and hypothesis
   c. whether the empirical findings of the paper support the hypothesis and/or theoretical conclusions

2. The critical analysis could include (but not be limited to) the following:
   a. Methodological issues
      i. whether the data presented supports the authors' claims as stated in the article.
      ii. some factors that were not controlled in a study or other ways in which it was incomplete.
   b. Suggestions
      i. further analysis of the data already collected that could tell us something more
      ii. logical alternatives to the authors' explanations of their results
      iii. relevance to theories and phenomena not discussed by the authors
      iv. additional predictions or experiments that could come out of the conclusions
      v. related issues that could be studied by similar approaches
      vi. possible next steps for the research program
   c. Relevance to other studies - relating the results to other findings in the literature
      i. relating the study to the greater theoretical context; how the findings of this paper extend our knowledge of this area of research (why is this study important and interesting?)
   d. Cite at least 2 other related references (empirical papers) from the literature other than the primary source paper. Websites, textbooks, and other secondary source materials may be used, but are not sufficient on their own.
# Topics to be covered and reading schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture and presentation topics</th>
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<tbody>
<tr>
<td>Sept 8</td>
<td>Course overview- Introduction to the research ideas</td>
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<tr>
<td>Sept 12</td>
<td>History</td>
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<td>Sept 19</td>
<td>Lecture on the multiple memory systems</td>
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<td>Sept 26</td>
<td>Presentation on module 1: Multiple memory systems I &amp; Lecture</td>
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<tr>
<td>Oct 3</td>
<td>Presentation on module 2: Multiple memory systems II &amp; Lecture</td>
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<tr>
<td>Oct 10</td>
<td>Lecture (except Oct 10, Monday Thanksgiving Day)</td>
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<tr>
<td>Oct 17</td>
<td>Presentation on module 3: Perceptual learning I &amp; Lecture</td>
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<tr>
<td>Oct 24</td>
<td>Presentation on module 4: Perceptual learning II &amp; MIDTERM EXAM</td>
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<tr>
<td>Oct 31</td>
<td>Presentation on module 5: Hippocampus: Spatial learning in humans I &amp; Lecture</td>
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<tr>
<td>Nov 7</td>
<td>Presentation on module 6: Hippocampus: Spatial learning in humans II &amp; Lecture</td>
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<tr>
<td>Nov 14</td>
<td>Presentation on module 7: Hippocampus: place cells &amp; Lecture</td>
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<tr>
<td>Nov 21</td>
<td>Presentation on module 8: LTP I: behavioural approaches &amp; Lecture</td>
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<tr>
<td>Nov 28</td>
<td>Presentation on module 9: LTP II: cellular approaches &amp; Lecture</td>
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<tr>
<td>Dec 5</td>
<td>Review and Final Exam Tutorial</td>
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<tr>
<td>Final Exam Period</td>
<td>Final Exam</td>
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</table>
Required Reading List

The items highlighted in yellow are the review/background papers for the module. For the modules without such papers listed, use the review paper in the previous module.

The empirical papers are the items underlined. Those are the ones that you are supposed to (1) discuss in group and generate written minutes, (2) write critiques, or (3) present in-class.

The rest of the papers are commentary to the empirical papers.

1. Multiple memory systems I

2. Multiple memory systems II

3. Perceptual learning I: visual system

4. Perceptual learning II: auditory system
5. Hippocampus: Spatial learning in humans I


6. Hippocampus: Spatial learning in humans II


7. Hippocampus: place cells


8. LTP I: behavioural works


9. LTP II: cellular approaches

