Psych 3L03 Neuroscience Laboratory

(2005-2006, Term 1, C01, Wed)

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   Mr. George Chan, Room 236 & 213, Ext. 26037 & 26031, ChanGSW@mcmaster.ca

3. Classroom: Psychology Building, Room 116
4. Virtual Classroom: http://www.learnlink.mcmaster.ca

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Student groups

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COURSE OBJECTIVES

In this course students will have the opportunity
(1) to learn various neuroscience techniques through hands-on experience in performing experiments,
(2) to gain experience in research design, including forming experimental hypotheses, designing experiments, collecting data, analyzing data, interpreting the empirical results, critically evaluating research papers,
(3) to practice communicating your findings through written and oral presentations.

BRIEF DESCRIPTION

This course consists of three major parts. The 1st part of the course, which is scheduled in the first few weeks of the
term, consists of a few small modules with the goal being to help students understand various neuroscience techniques and develop skills in experimental design and in communication. This will be accomplished through a series of brief lectures, hand-on exercises and student presentation.

The 2nd part of the course is a group lab project. The class will be divided into groups (4-5 students each) and each group will design and conduct their own experiment. You are expected to do literature research to derive your hypothesis. You will do most of your work without direct supervision but the TAs and the instructor will be available to you as resource persons and should be consulted on a regular basis during the development, running and analysis of the experiments. As an individual in a group, you should provide written reports on the progress and eventually as a group, give an oral presentation to the whole class about your study.

For the 3rd part of the course, students will work in pairs to perform a dissection of a sheep brain. You are required to recognize and memorize some important brain structures with the help of the TAs and a sheep brain atlas. A bell ringer style exam will be conducted afterward.

During the course, we will review topics such as research ethics, research design, statistics, use of spreadsheet software, data collection, and presentation, etc.

LIST of CONTENT

Lectures

1. General research issues
   1. Ethics in research using human subjects
   2. Research design
   3. Basic statistical analysis
   4. Writing of lab report
   5. Oral presentation
2. Topics related to the lab projects
3. Spreadsheet software: Microsoft Excel (tutorial)
# SCHEDULE

<table>
<thead>
<tr>
<th>Wk</th>
<th>During Class</th>
<th>Due in class</th>
<th>Things to do before next class</th>
</tr>
</thead>
</table>
| 1  | LECTURE (HJ): Introduction to the course  
   2. Demo: Literature search |  | 1. Review course outline  
   2. Get familiar with LearnLink, post comments for the design of the course |
| 2  | LECTURE (HJ): Neuroscience technique overview  
   2. STUDENT GROUP PRESENTATION: Neuroscience techniques | Presentation handout & overhead (group) | 1. Excel tutorial -- basics (if needed, formal tutorial will be scheduled for 1 hour, at computer lab, PC 403) |
| 3  | LECTURE (GC): Experimental design basics and exercise: Sample experiment (reflex game)  
   1. GROUP DISCUSSION FOR P2 | Excel assignment 1 (individual) | 1. running experiment on the reflex game experiment  
   1. Excel tutorial -- statistics (if needed) |
| 4  | STUDENT GROUP PRESENTATION: Reflex game study  
   2. LECTURE: Introduction to Project 2; overview of research on spatial processing | 1. Presentation handout & overhead  
   2. Excel assignment 2 (individual) | 1. P2: Literature search  
   2. P2: read related research papers  
   3. P2: 1st formal group meeting to decide on the project direction |
| 5  | LECTURE (JC): Overview of the brain structures  
   2. TUTORIAL (JC): Sheep brain dissection  
   3. GROUP DISCUSSION FOR P2 |  | 1. GROUP DISCUSSION FOR P2  
   2. Read instructor's guide on writing lab report |
| 6  | LECTURE: Ethics in research using human subjects  
   2. TUTORIAL (JC): Sheep brain dissection  
   3. Data collection for P2 | Proposal for P2 (individual) | Data collection for P2 |
| 7  | LECTURE on writing lab report, part 1 (Intro and Method)  
   2. Data collection for P2 |  | Data collection for P2 |
<table>
<thead>
<tr>
<th>8</th>
<th>1. TUTORIAL (JC): Sheep brain dissection</th>
<th>Introduction and Method for P2 (individual)</th>
<th>Data collection for P2</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>1. LECTURE on writing lab report, part 2 (Results and Discussion)</td>
<td>2. TUTORIAL (JC): Sheep brain dissection review (optional)</td>
<td>Data analysis for P2</td>
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<tr>
<td></td>
<td>3. Data analysis for P2</td>
<td></td>
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<tr>
<td>10</td>
<td>Sheep brain practical exam</td>
<td>Results and Discussion for P2 (individual)</td>
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<tr>
<td>11</td>
<td>STUDENT GROUP PRESENTATION</td>
<td>Presentation handout &amp; overhead (group)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>STUDENT GROUP PRESENTATION</td>
<td>Presentation handout &amp; overhead (group)</td>
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<tr>
<td></td>
<td>END OF THE TERM</td>
<td>1. P2 lab notebook (group)</td>
<td>2. P2 group peer evaluation (individual)</td>
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## EVALUATION

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>DETAILS</th>
<th>GRADE (%)</th>
<th>Identifier for electronic submission (file name &amp; page heading)</th>
<th>hardcopy requirement</th>
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<td>as an</td>
<td>as a group</td>
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<tr>
<td></td>
<td></td>
<td>individual</td>
<td>group</td>
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<td>Part 1</td>
<td>Excel assignment 1</td>
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<tr>
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<td>Excel assignment 2</td>
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<td>P1ExpSlides, P1ExpOutline</td>
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<td>Part 2</td>
<td>P2 Proposal</td>
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<td>P2 Intro &amp; Method</td>
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<td>P2ReportPart1</td>
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<td>P2 Results &amp; Discussion</td>
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<td>P2ReportPart2</td>
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<tr>
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<td>P2 presentation</td>
<td>15</td>
<td>P2ExpSlides, P2ExpOutline</td>
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<tr>
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<td>quality of the experimental work</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td>Lab notebook</td>
<td>5</td>
<td></td>
<td>yes</td>
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<tr>
<td>Part 1 &amp; Part 2</td>
<td>Individual contribution to the group (rated by group peers)</td>
<td>10</td>
<td>P2PeerEvaluation</td>
<td></td>
</tr>
<tr>
<td>Part 3</td>
<td>neuroanatomy (sheep brain) test</td>
<td>20</td>
<td></td>
<td></td>
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<tr>
<td>Participation</td>
<td>rated by instructor and TAs</td>
<td>10</td>
<td>CourseFeedback</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>65</td>
<td>35</td>
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DETAILED REQUIREMENTS

1. In addition to the occasional hard copy requirements, with the exception of group lab notebook (P2), **ALL** documents should be submitted electronically using anonymous ftp to ftp://psyftp.mcmaster.ca. Upload the files to directory “sun”. You can use various software to do ftp. If, and only if, you have difficulty sending files through ftp, you could send the file through an email attachments to the instructor at sunhong@mcmaster.ca

   1. Use expression "3LWed_AssignmentType_LastName_FirstName" in all of the following (if applicable):
      1. in the file name (plus file extension, e.g., .xls or .doc or .ppt)
      2. in the page heading in your Word or Excel file (plus the page number and total number of pages)
      3. in the email subject heading, if you are sending through email attachment

   2. replace "AssignmentType" with the proper identifier (see table above).

   3. replace "LastName_FirstName" with "Group"# for the group project.

2. Assignments
   1. for some assignments, but for most students, feedback may not be provided individually. Instead, general comments will be provided to the whole class.

3. Full Lab Reports (P2, for detailed requirement see guide)
   1. All written reports submitted must be double-spaced, one-sided, 8.5x11 inch with 1 inch margins using a 12-point font.
   2. Late penalty will imposed at 10% of that part per day.
   3. You should submit both hard copy and electronic files, which include both text and figures (in Microsoft Word format, with figure copied from Excel graph) and data (in Excel format) for the analysis. The Excel should have clear label (e.g., create each chart in a separate sheet and rename the sheet into Fig 1) of the corresponding figure.
   4. Grades will be given according to style (APA format), grammar, content, and also on the quality of the writing, coherency, and clarity of thought.
   5. In addition, the quality of the research (incl., how you conduct the experiments and perform data analysis) will also be graded separately.
   6. You are required to append with your report a photocopy of important articles (at least 3) cited in your report.

4. Project 2
   1. Proposal
      1. The format of proposal could be a short version of the introduction and method of a typical lab report. You are encouraged to write in the format of a formal introduction and method (longer than 2~3 pages) at this point, as that will be required later anyway.
      2. the first part of the proposal should be literature review. You are required to also submit a photocopy (or electronic file) of important articles (at least 3) cited in your report.
         1. You should provide detailed review of the articles closely related to your research, much like writing an introduction of a lab report. You should comment on how the research would be related to your project.
         2. To demonstrate the work you have done, at the end of your literature review, you are also encouraged to list (and possibly provide a sentence or two of summary -- could be in point form) the articles that you have researched but eventually decide not to discuss in detail.
      3. the 2nd part to the proposal should be description of your experiment.
   2. Data analysis should be performed during the process of running the experiment, rather than at the end of the experiment. You are encouraged to present your results often to the instructor or teaching assistants to seek feedback.
   3. Each group is free to organize itself as it thinks best (e.g., dividing responsibility, working in sub-group, or working together). But it might be practical to designate one member of the group as the facilitator/organizer for each stage of the project and he or she will be eventually responsible for the performance of that stage.
4. **Presentation**
   1. Before the presentation, an electronic file including background information regarding the project (updated since the last progress reports, e.g., literature review and proposal, and summary of the results if available) should be sent to the instructor electronically. This file will then be posted on the web for other students to review before the presentation.
   2. Everyone in the group should participate in the final oral presentation and group members must try to participate equally in the presentations.
   3. Oral presentation will be graded for group performance as well as for the performance of each individual.
   4. Presentation should incorporate proper audiovisual aids (e.g., powerpoint slides) and handout (if necessary). The final version of the presentation slides (e.g., powerpoint file) should be sent to the instructor electronically afterwards.

5. **Peer evaluation within the group**
   1. At the end of the project, each member should provide written evaluation on the contribution of each member of the group
   2. Both grades (in terms of %) and written justification should be provided for ALL the aspects of project (e.g., including intellectual contribution and contribution of time and effort, etc).
   3. Normally, all group members will be given the same grade for the joint performance in project 2 (e.g., oral presentation, lab report, etc), but the instructor reserves the right to use the grades from peer evaluation as a factor to adjust other parts of the P2 grade for certain individuals (e.g., those who contribute very little to the joint effort).

6. **Laboratory notebook (P2)**
   1. It must contain enough information to allow yourself or others to repeat the work exactly as you have done it. Record in your notebook everything that you did and observed as you carried out the experiment as well as each of the steps and the results when you analyze your data. Fasten copies of any graphs or images obtained during the course of the experiment or analysis into the book.
   2. The first page of the notebook is reserved for a table of contents. All subsequent pages are numbered. The table of contents should indicate the title of the experiment and the page number in the book.
   3. Recordings in the notebook should be written at the time when the experiment/analysis is carried out (NOT at the end of the term and right before the notebook is due!).

5. **Participation grade will be given considering the student's performance in the following aspects:**
   1. Attend class and group meeting and arrive on time
   2. **Active learning**
      1. Contribute to class and group discussion
      2. Contribute to LearnLink discussion
      3. Contribute to experiment
      4. Contribute to literature search (students are encouraged to share suitable articles to the group, possibly through Learnlink)
      5. Show initiative in organizing group activities
   3. Provide extensive and informative feedback to the oral presentation of other groups.
   4. Provide feedback and suggestion to the teaching of this course

6. **Final Grade**
   1. The instructor reserves the right to adjust final marks up or down, on an individual basis, in the light of special circumstances and/or the individual's overall performance in the course. Furthermore, the instructor reserves the right to change the weight of any portion of this marking scheme.
   2. Final grades will be assigned according to the following conventional scheme:

<table>
<thead>
<tr>
<th>Grade</th>
<th>90-100</th>
<th>85-89</th>
<th>80-84</th>
<th>77-79</th>
<th>73-76</th>
<th>67-69</th>
<th>63-66</th>
<th>60-62</th>
<th>57-59</th>
<th>53-56</th>
<th>50-52</th>
<th>49-0</th>
</tr>
</thead>
<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>
</tr>
</tbody>
</table>
READINGS

1. Required Readings

2. Recommended Readings
   1. Guide to writing lab report

3. Literature search guide by Dr. Sun for Independent Project

4. Web Links Relevant to the Course
   1. guide to writing research reports by Paul C. Cozby
      1. http://www.uwsp.edu/psych/apa4b.htm
   2. some useful links from a course taught by Dr. Christopher Green of York Univ
   3. Sheep brain dissection