

Psych 3MM3: Cognitive Neuroscience Laboratory

(2007-2008, Term 2)

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3. Classroom: Psychology Building, Room 316 & 116, Monday 2:30-5:30 pm
4. Virtual Classroom: <http://www.learnlink.mcmaster.ca>
 - Do not send email to instructor’s learnlink mailbox
5. Course web page: <http://vr.mcmaster.ca/lab/3MM3web/>

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COURSE OBJECTIVES

In this lab course students will have the opportunity to learn to conduct research in the area of cognitive neuroscience. They will

- (1) gain experience in research design, including forming experimental hypotheses, designing experiments, collecting data, analyzing data, interpreting the empirical results, critically evaluating research papers,
- (2) practice communicating your findings through written and oral presentations.
- (3) learn more about the brain through a hand-on experience of brain dissection.

BRIEF DESCRIPTION

This course consists of three major parts. The 1st part of the course, [project 1 \(P1\)](#) which is scheduled in the first few weeks of the term, consists of a small group project with the goal being to help students develop skills in experimental design and in communication. This will be accomplished through having all groups in the class conducting the same experiment and each student write a lab report individually.

The 2nd part of the course is also a group lab project ([project 2, P2](#)). The class will be divided into 4 groups (4 students each) and each group will design and conduct their own experiment. You are expected to do a 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 help you as resource persons and should be consulted on a regular basis during the development, running and analysis of the experiments. In the end, the group should provide a written report and give an oral presentation to the whole class about their studies.

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. Statistical software: SPSS

SCHEDULE

Wk	Due 24 hours before class	During Class	Things to do before next class, in addition to assignments
1		<ul style="list-style-type: none"> LECTURE: Introduction to the course P1: Introduction P1: Group discussion for the method 	<ul style="list-style-type: none"> Review course outline Email instructor your comments for the design of the course Statistics review (including ANOVA)
2	P1: Proposal (group)	<ul style="list-style-type: none"> LECTURE: Experimental design basics P1: Class discussion of the method - finalize experimental procedure 	<ul style="list-style-type: none"> P1: data collection Read instructor's guide on writing lab report
3	P1: Data (group)	<ul style="list-style-type: none"> LECTURE: Scientific communication LECTURE: Writing lab report, part 1 (Intro and Method) P1: Lecture: Rationale of the study P1: Class Discussion: Data analysis (TAs) 	
4	P1: Intro & Method (individual)	<ul style="list-style-type: none"> P1: Lecture: Review of Student Writing (Intro & Method) Lecture on writing lab report, part 2 (Results and Discussion) 	<ul style="list-style-type: none"> Possible switching of groups
5	P1: Results and Discussion (individual)	<ul style="list-style-type: none"> P1: Lecture: Review of Student Writing (Results and Discussion) P2: Lecture: conducting independent research P2: Lecture: Project 2 (P2) Lecture: ethics in conducting research using human subjects (TA) P2: Group discussion P1: instructor/TA: feedback on the Lab Notebook 	<ul style="list-style-type: none"> P2: Literature search (a guide compiled by Dr. Dukas) P2: read related research papers P2: decide on the project
6		<ul style="list-style-type: none"> P3: TUTORIAL: sheep brain dissection P2: Group discussion 	P2: Data collection
7	P2: Proposal & pdf files of the relevant literature (group)	<ul style="list-style-type: none"> P3: TUTORIAL: sheep brain dissection P2: Feedback to groups on the 	P2: Data collection

		proposal	
8	P2: Intro and Method & pdf files of the relevant literature (group)	<ul style="list-style-type: none"> • P3: TUTORIAL: Sheep brain dissection (optional) • P2: Data collection • P2: Feedback to groups on Intro & Method 	P2: Data collection
9		<ul style="list-style-type: none"> • P3: TUTORIAL: Sheep brain dissection (optional) • P2: Group discussion: pilot data and data analysis • P2: Group discussion: Interpretation of the results 	P2: Data analysis
10	P2: Results and Discussion & pdf files of the relevant literature (group)	<ul style="list-style-type: none"> • P2: Sheep brain practical exam • P2: Group discussion: Feedback from the instructor/TAs on the Results/Data Analysis • P2 Lecture: presentation requirement 	
11	Presentation handout & overhead (group)	STUDENT GROUP PRESENTATION in class	
12	Presentation handout & overhead (group)	STUDENT GROUP PRESENTATION in class	
	<ol style="list-style-type: none"> 1. Lab notebook (group) 2. Statement of contributors to different sections of P2 (group) 3. Group peer evaluation (individual) 	END OF THE TERM	

EVALUATION

CATEGORY	DETAILS	GRADE (%)		<i>Identifier</i> for electronic submission (file name & page heading)	hardcopy requirement
		as an individual	as a group		
P1	Proposal		1	P1Proposal	No
	Intro & Method	15		P1ReportPart1 P1ReportPart1-Ref#	Yes No
	Results & Discussion	15		P1ReportPart2 P1ReportPart2-Ref# P1ReportPart2-Data	Yes No No
P2	Proposal		1	P2Proposal	No
	Intro & Method		8	P2ReportPart1 P2ReportPart1-Ref# P2ReportPart1-Software	Yes No No
	Results & Discussion		8	P2ReportPart2 P2ReportPart2-Ref# P2ReportPart2-Data	Yes No No
	Presentation		10	P2Slides P2Handout	No No
	quality of the experimental work		5		
P1 & P2	Lab notebook		2		yes
	Individual contribution to the group (rated by group peers)	10		PeerEvaluation	No
P3	Neuroanatomy (sheep brain) test	15			
Participation	rated by instructor and TAs	10		CourseFeedback	No
TOTAL		65	35		

DETAILED REQUIREMENTS

1. Assignments

- In addition to the hard copy requirements, with the exception of group lab notebook, **all** documents should be submitted electronically using anonymous ftp to <ftp://psyftp.mcmaster.ca/sun/>. You may use Window Explore (not Internet Explore) or a FTP software to upload your file. Copy the ftp link above to the address section of your Window Explore, then drag the icon of your document from the folder on your own computer to the ftp folder. You should see your file name appeared on the ftp site after you upload the file.
- Use expression "**3MM3_AssignmentType_Group#_LastName_FirstName**" in *all* of the following (if applicable):
 - a. in the file name (expression plus **file extension**, e.g., .xls or .doc or .ppt)
 - b. in the page heading (also include the page number and total number of pages) of your Word file
 - c. Replace "*AssignmentType*" with the proper assignment *identifier* (see table above).
 - d. Replace "#" with your group number (e.g., 1, 2 ...).
 - e. For group works, only include the group numbers (no need for your name) in your filename/heading expression.
 - f. For lab reports, you are required to send in electronic version of the references (pdf files) of important articles cited in your report. Use proper *identifier*-Ref# in your file name.
- The due dates of the most of the assignments are one day before class time. This applies to the electronic files of the assignments. The hardcopies (with identical content of the electronic ones) can be handed in during class.

2. Lab Reports (for detailed requirement see [guide](#))

- All written reports submitted must be double-spaced, one-sided, 8.5x11 inch with 1 inch margins using a 12-point font.
- Late penalty will imposed at 10% of that part per day.
- You should submit *both* hard copy and electronic files, which include both text and figures (in Microsoft Word format, with figure copied from Excel/SPSS graph) and data (in Excel/SPSS format) for the analysis.
- Grades will be given according to style (APA format), grammar, content, and also on the quality of the writing, coherency, and clarity of thought.
- You are required to email the pdf files of important articles (at least 3) cited in your report.

3. Project 2

- Proposal
 - a. 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.
 - b. the first part of the proposal should be literature review. You are required to also submit electronic files of important articles (at least 3) cited in your report.
 - c. 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.
 - d. 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.

- e. the 2nd part to the proposal should be description of your experiment.
- 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.
- Presentation
 - a. Before the presentation, electronic files relevant to the presentation should be uploaded to the ftp site. These files will then be posted on the web for other students to review before the presentation.
 - b. Everyone in the group should participate in the final oral presentation and group members must try to participate equally in the presentations.
 - c. Oral presentation will be graded for group performance as well as for the performance of each individual.
 - d. 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.
- 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.
- At the end of P2, each group should provide the name of the major contributor(s) to the each section of the project and provide justification for the choices and such statement should be approved by the majority of the group members. The major sections that should cover (but not limit to) the following
 - a. Generate of experimental ideas (not necessarily the one adopted)
 - b. Generate of experimental design
 - c. Finalize the procedure
 - d. Prepare experimental apparatus, materials including software
 - e. Write proposal
 - f. Write different sections of the lab report
 - g. Organize, manage the experiment progress

4. Laboratory notebook

- 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 plan for the experiment and perform and observe as you carry out the experiment as well as each of the steps and the results when you analyze your data.
- Fasten copies of any diagram, graphs or images obtained during the course of the experiment or analysis into the book, if these files have not been sent to the instructor electronically.
- On the top right corner of each page, specify the name of the individual(s) who produced the note and individual(s) who performed the task.
- 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.
- Recordings in the notebook should be written at the time when the experiment/analysis (for both P1 and P2) is carried out (*NOT at the end of the term and right before the notebook is due!*). Bring these notes to every class, instructor and TAs may check on them every now and then.

5. Peer evaluation within the group

- At the end of the project, each member should provide written evaluation on the contribution of each member of the group.

- Both grades and written justification should be provided for ALL aspects of the two experimental projects (e.g. including intellectual contribution and contribution of time and effort, etc).
 - a. at the beginning of your file, list the grades for all members (except you) of your groups for the following two aspects of their contributions (mark out of 10)
 1. intellectual contribution
 2. contribution of time and effort
 - b. then the justify the grade you give for each member of the group
- 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. **Class participation** grade will be given considering the student's performance in the following aspects:

- Attend class and group meeting and arrive on time
- Active learning
 - a. Contribute to class and group discussion
 - b. Contribute to LearnLink discussion
 - c. Contribute to experiment
 - d. Contribute to the lab notebook of the group
 - e. Contribute to literature search (students are encouraged to share suitable articles to the group, possibly through learnlink)
 - f. Show initiative in organizing group activities
- Provide extensive and informative feedback to the oral presentation of other groups.
- Provide feedback and suggestion to the teaching of this course.

7. Final Grade

- a. 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.

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

90-100	85-89	80-84	77-79	73-76	70-72	67-69	63-66	60-62	57-59	53-56	50-52	0-49
A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F

READINGS

1. Required Readings

1. Book for Project 3: Vanderwolf, C. H. and Cooley, R. K. (1990). *The sheep brain: A photographic series*. London, Ontario, Canada: A.J. Kirby Co. (Need page 15-40). Available in bookstore.

2. Recommended Readings

1. Guide to writing lab report

1. American Psychological Association. (2001). *Publication manual of the American Psychological Association* (5th ed.), Washington, DC: Author.