BCS204: Lab in Cognitive Neuroscience (4 Cr.)   Spring 2026
Time: Mondays and Wednesdays, 11:50am – 1:05pm
Room: Meliora 178
Course Instructor: Dr. Martin Yang chung-lin.yang@rochester.edu
Office: Meliora 322
Office Hours (both in person and Zoom):
11am -12:30pm Tuesdays
11 – 11:30am Wednesdays
Zoom: https://rochester.zoom.us/j/8762705015

Graduate TA: Xinyi Yuan (xyuan15@ur.rochester.edu)
Office hours: 11am-12pm on Fridays, location TBA

Undergraduate TA: Grace Yu (yyu86@u.rochester.edu)
Office hours: 10:30-11:30am on Mondays, location TBA

Course description: This lab course introduces methods used in cognitive neuroscience, a field that examines cognitive phenomena in terms of their underpinnings in the brain. It covers brain imaging approaches to studying cognition and provides hands-on knowledge for functional magnetic resonance imaging (fMRI) and electroencephalography (EEG) experiment design and data analysis. This course will give you a sense of what lab research in cog-neuro is like and better prepare you for other research opportunities. Another major requirement of the course is academic writing, so you will also learn how to write a research proposal.

This course follows the College credit hour policy for four-credit courses. This course meets twice weekly for 3 academic hours per week. The course also includes independent out-of-class assignments (group projects, lab notes, and readings) for at least 1 academic hour per week.

Textbooks (recommended but not required):
An introduction to the event-related potential technique by Steven Luck (2e) (available as an E-Book in the Library)
Handbook of functional MRI data analysis by Poldrack, Mumford and Nichols (2011) (on Library reserve: https://bit.ly/2LegRN7). Selected chapters are already posted on Blackboard under "Readings".

Software: You will learn to use EEGLAB (https://sccn.ucsd.edu/eeglab/download.php) and SPM12 (https://www.fil.ion.ucl.ac.uk/spm/software/download/), both of which requires MATLAB (https://tech.rochester.edu/software/matlab/). We will also use Excel for behavioral data processing.

Course requirements:
1. **Participation (20.5%)**: attendance is a basic and important requirement in a lab (and also in any lab where you want to gain research experiences). That said, active participation in the discussions, exercises and lab activities/demos are

expected and required. The following items will also be counted toward your participation:

    a. In-class exercises and lab activities (**10%**): This doesn't require submissions on Blackboard. You can just show us your completed work while we walk around during the data analysis sessions, and <u>we will keep track of it</u>. **If you couldn't finish the in-class work for any reason** (e.g., absence from the class due to illness/emergencies or technical issues), **email your make-up work to the undergraduate TA (with explanations of why you couldn't finish it in class) <u>by noon on the next day after the class</u>**. However, if you keep running into the same technical issue that prevents you from completing the work and cannot submit it by noon of the next day, let us know and we will help you out. (Note that the datasets for the in-class work are different from those used in the lab assignments and lab report.) <u>The lab demos are required and also counted as in-class exercises.</u>

    b. 3 short quizzes (**9%**) (see schedule below for dates): Each quiz contains 5-6 questions (multiple-choice and T/F questions). As long as you pay attention to the <u>lectures/lab instructions/lab demo</u> and actively participate in the lab exercises, these quizzes should be easy.

    c. Participation in other groups' presentations (**1.5%**): **everyone should ask at least 3 questions or give at least 3 comments/suggestions in total during the three presentation sessions** (i.e., at least one comment/question per session). <u>We will keep track of this!</u>

2. **Research ethics (3**%)
   a. Plagiarism quiz **(1%)** (graded as Complete/Incomplete)
   b. CITI training (**2%**) (graded as Complete/Incomplete): https://www.citiprogram.org/?pageID=668 (Register for a new account if you don't have one, and select "University of Rochester" in the search box; Do only <u>the Social Behavioral Module</u>)

3. **Lab assignments (10%):** mostly just output of graphs from data processing (**submitted individually**)
   a. EEG: two assignments (**2.5% each**)
   b. fMRI: two assignments (**2.5% each**)

4. **Lab report** (min. <u>6 pages</u> **plus** one page of references) (**6%**): Write up a brief report including the following: introduction (including a thorough literature review), method, results, discussion and conclusion. Detailed instructions will be posted on Blackboard and also given in class. **(Individual submission)**

5. **Literature review**: A review of journal articles discussed in class OR articles of your choice that you found interesting. Critique the study and discuss how the study might be done differently if you were to replicate it. Detailed instructions will be posted on Blackboard. The review should be at least 3 pages long plus 1 page of references. (**4.5%**) **(Individual submission)**

6. **Proposal writing (23.5%)**
   Each of the following items will be due on different dates. Instructions for each item will be posted on Blackboard under "Assignments". Each group will choose one topic and work on it together. **Equal contribution from each group member to the project is expected. When submitting your group assignments, please either put the link to your Google Docs in the submission comment box OR use two different font colors to differentiate the parts written by each group member.**

   a. Submission of 3 possible topics on Blackboard as a word document (3.5%) **(group submission)**
   b. Write-up of motivation/hypotheses/research questions (3.5%) (**group submission**)
   c. Write-up of experimental design (3.5%) (**group submission**)
   d. Final proposal (12 pages of text and figures, plus a one-page abstract and references) (13%) (**group** submission)

   All written assignments should follow the same format: 1" margins, double-spaced, 12-pt Times New Roman, **course number and your name on the header** instead of the main body of text. **For every single written assignment, be sure to properly cite your resources.** Citation should follow the APA format. A maximum of 5 pts will be deducted for all graded written assignments if the format fails to meet the stated requirements here.

7. **Project presentations (31%):** Grading is based on several criteria, including clarity of slides, organization, delivery, and handling of questions from the audience.

   For each presentation, please indicate the percentage of the contribution by each group member on the bottom of the title slide
   (e.g., Hypothesis: Martin 40%; Aaron 60%;
   Literature review; Martin 50%; Aaron 50%;
   Research questions: Martin 50%; Aaron 50%)

   a. Group presentation of topic, motivation and hypothesis (9.5%)
   b. Group presentation of detailed experimental design and analysis (9.5%)
   c. Group presentation of final project (12%)

8. **Reflection (1.5%)**

Class policies:
1. Academic misconduct
   a. All assignments and activities associated with this course must be performed in accordance with the University of Rochester's Academic Honesty Policy. More information is available at: www.rochester.edu/college/honesty

<u>Plagiarism and any form of academic misconduct will be reported following the guidelines set by the University.</u>

<u>Be sure to carefully read "AvoidingPlagiarism.pdf" by Remmel uploaded to Blackboard.</u>

b. Considering the prevalence of AI nowadays, the use of AI tools is only approved for the following two purposes in this class:

1) Searching for relevant studies when searching on Google doesn't give you the results you want. <u>But beware of possible fake references generated by AI!</u>

2) Proofreading your written assignments for grammatical errors and typos. The use of AI for this purpose should be limited to <u>only words/phrases</u> but not whole sentences. If you do use AI-suggested word choices or short phrases (e.g., by using Grammarly), it should be no more than 2% of the text (e.g., in a 2000-word paper, the AI-suggested changes of words/phrases should be no more than 40.) **And you "must" highlight the parts (by using a different font color) that are suggested by AI.**

If you do use AI for any part of your work (not just the actual writing but also brainstorming or planning), please clearly state what you used it for on the first page of the assignment (or as a footnote on the first page).

All other purposes of AI use not listed above will be considered as "unauthorized aid" and be reported to the Academic Honesty Board. Multiple AI content detectors will be used when grading your assignments. **Whenever you're not sure whether your use of AI tools complies with the course policy, please do feel free to consult me or the graduate TA BEFORE you start using it.**

2. Special accommodation: If you need special accommodation (e.g., medical or family emergencies, observance of religious holidays/cultural events, etc.), please let us know as early as possible. We will do our best to accommodate! <u>If you can't take a quiz or complete an assignment on time for health reasons, documentations are required for make-ups or late submissions (see below for COVID/flu-related symptoms). Otherwise, late submissions won't be accepted.</u>

If you are not feeling well (even just have some mild symptoms), are waiting for COVID test results, or have been in close contact with COVID patients, just let me know by sending me an email at your earliest convenience. We can discuss how you can make up the missed work. If unfortunately you test positive for COVID,

please carefully follow the instructions and procedures here:
https://www.rochester.edu/coronavirus-update/students/isolation-guidelines/

3. Mobile devices
    Please silence your mobile devices. No cellphone/smartphone or any other
    entertainment devices are allowed while class is in session. However, **laptop use is
    strongly encouraged for <u>data analysis and presentations.</u>**

Grading

The final grades will be based upon the following scale:

A	93 -100
A-	90 - 92
B+	87 - 89
B	83 – 86
B-	80 - 82
C+	77 – 79
C	73 – 76
C-	70 – 72
D+	67 – 69
D	63 – 66
D-	60 – 62
E	below 60

Class schedule (subject to change):

Week	Date	Topic	Project timeline	Recommended Readings and Lab Work
1.1	1/21	Course requirements; Introduction, Academic dishonesty policy	Get to know each other; form groups; Research ethics https://www.turnitin.com/static/plagiarism-quiz/ **(email your results to bcsc204.ur@gmail.com by 1/24**; submit all your attempts; you must score at least **12 out of 13**)	https://xerte.cardiff.ac.uk/play_8694#page1 http://integrity.mit.edu/handbook/citing-your-sources/avoiding-plagiarism-cite-your-source
1.2	1/23	Intro to EEG studies		Data Processing in Excel
2.1	1/26	Intro to EEG studies		Data Processing in Excel
2.2	1/28	Intro to fMRI studies	**CITI training due 1/31**	Data Processing in Excel

			(upload your certificate to Blackboard) **Decision on groups**; start thinking about possible topics	
3.1	2/2	Intro to fMRI studies		Data Processing in Excel
3.2	2/4	Principles of EEG recording		Luck Ch. 2, Data Processing in Excel
4.1	2/9	Common ERP components	**Quiz 1 (week 1.2 – 3.2)**	Luck Ch. 3, Data Processing in Excel
4.2	2/11	EEG experiment design		Luck Ch. 4
5.1	2/16	EEG data analysis		Luck Ch. 5
5.2	2/18	EEG demo	**Literature review due 2/20**	
6.1	2/23	EEG demo	**Submit 3 possible topics on Blackboard 2/24**	
6.2	2/25	EEG demo		
7.1	3/2	EEG analysis		
7.2	3/4	EEG data analysis	**Lab assignment 1 due 3/5**	Luck Ch. 9
8	3/9-11	**Spring Break**		
9.1	3/16	EEG analysis – final session Project consultation session		
9.2	3/18	Basic of fMRI fMRI experimental design	**Quiz 2 (week 4.1 – 7.2)** **Lab report due 3/21**	Poldrack Ch.1
10.1	3/23	**Presentation of topics, hypothesis and research questions**		
10.2	3/25	**Presentation of topics,**	**Lab assignment 2 due 3/27**	

		hypothesis and research questions (cont'd) fMRI data preprocessing		
11.1	3/30	fMRI preprocessing	**Topic/Hypotheses/Research questions due**	
11.2	4/1	fMRI data preprocessing		Poldrack Ch. 3
12.1	4/6	fMRI data preprocessing Project consultation		
12.2	4/8	**fMRI demo at CABIN**	**Lab assignment 3 due 4/10**	
13.1	4/13	**Presentation of detailed experiment design and analysis**		
13.2	4/15	**Presentation (cont'd)** fMRI analysis		
14.1	4/20	fMRI analysis	**Write-up of experimental design due**	
14.2	4/22	fMRI analysis	**Quiz 3 (9.1 – 13.2)**	
15.1	4/27	**Final presentation**		
15.2	4/29	**Final presentation**	**Lab assignment 4 due 5/1**	
	5/6	**Proposal due**		
	5/8	**Reflection due**		