# Psych 360: Laboratory in Cognitive Neuroscience
Fall 2022
Tues/Thurs 1:00-2:30
Prof. Rebecca Compton
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## Course Overview:

Examines methodologies used to study the neural basis of higher mental functions in humans. Students will gain hands-on experience with electrophysiological (EEG/ERP) recording methods and will develop and implement a class project using ERP methods to address questions about cognition.


## Course Objectives:

- Gain appreciation for challenges in connecting physiological and psychological constructs
- Gain experience in working hands-on with human research participants
- Practice skills in brainstorming and developing project ideas
- Increase fluency with key concepts in experimental design and statistics
- Gain experience, confidence, and skill in working with specialized technology and software for EEG data collection, preprocessing, and statistical analysis


## Course Requirements and Grading:

Papers:

      20 pts  Research proposal (due by 5pm on 9/23)
      15 pts  First draft of project intro/methods (due in class on 11/15)
      25 pts  Final lab report (due by noon on 12/16)

Smaller assignments:

      20 pts  Quizzes (10 pts each; self-scheduled during weeks 6, 13)
      15 pts  Lab exercises (5 pts each; completed in-class during weeks 9, 10, 11)
      5 pts    Participation/effort

100 points total

# Course Schedule

**Note on readings:**

During the first few weeks of the semester, some background chapters about EEG/ERP methods are assigned on the course schedule. Unfortunately, most published readings about these methods can feel pretty dry and technical. Do not feel like you need to absorb every word or be entranced by it. Look over the readings before the class period for which they are assigned, so that you have some basic familiarity with the vocabulary. We will go over everything that is important during class time. You can also use the readings after class to further clarify concepts or review. Readings are generally not listed in the second half of the semester because we will focus more on hands-on work with data collection and analysis. You will need to do some reading for your project proposal and lab report assignments; those are not listed on the syllabus because they will depend on the nature of the project that we design. More details will be provided in class.

| Week | Date | Activity | Assignment |
|------|------|----------|------------|
| 1 | 8/30 | Overview/organization | |
| | 9/1 | EEG basics | Read EEG pocket guide |
| 2 | 9/6 | ERP basics | Read Luck Ch. 1 |
| | 9/8 | ERP components | Read Luck Ch. 3 |
| 3 | 9/13 | EEG cap application (Group A) – Sharpless 510 | Read Luck Ch. 5; cap application documents |
| | 9/15 | EEG cap application (Group B) – Sharpless 510 | Read Luck Ch. 5; cap application documents |
| 4 | 9/20 | ERP research design | |
| | 9/22 | Ethics in ERP research | Proposals due by 5pm 9/23 |
| 5 | 9/27 | Discuss project proposals | Read class members' proposal summaries |
| | 9/29 | Discuss project proposals | |
| 6 | 10/4 | Finalize project | Quiz 1 (self-scheduled this week) |
| | 10/6 | Finalize project | |

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| 7 | 10/18 | Cap application/project protocol review (Group A) – Sharpless 510 | |
| | 10/20 | Cap application/project protocol review (Group B) - Sharpless 510 | |
| 8 | 10/25 | Discuss intro/methods paper assignment | Read Senholzi & Ito paper Data collection (outside class) |
| | 10/27 | Data processing - Overview | Data collection (outside class) |
| 9 | 11/1 | Data processing – Data cleaning | Data collection (outside class) Lab exercise 1a, 1b (in class) |
| | 11/3 | Data processing – Re-referencing and Epoching | Data collection (outside class) Lab exercise 1c, 1d (in class) |
| 10 | 11/8 | Data processing – Averaging | Data collection (outside class) Lab exercise 2a, 2b (in class) |
| | 11/10 | Data processing – Peak quantification | *Last day for data collection: 11/12* Lab exercise 2c (in class) |
| 11 | 11/15 | Data processing with class dataset | First draft of intro/methods due in class |
| | 11/17 | Data processing with class dataset | Lab exercise 3 (in class) |
| 12 | 11/22 | Statistics: review | |
| | 11/24 | THANKSGIVING | |
| 13 | 11/29 | Statistics in Jamovi | Quiz 2 (self-scheduled this week) |
| | 12/1 | Statistics in Jamovi | |
| 14 | 12/6 | Project presentation/ discussion | |
| | 12/8 | Wrap-up/discuss final paper | |

Final lab report due by end of finals period, 12 noon on Friday 12/16.

**Summary of Graded Assignments:** (details to be posted on Moodle)

## 1. Research Proposal (20 points)

Each student will develop an idea for a research project for the class to carry out during the semester. This research idea will be generated after learning some background about EEG/ERP methods early in the semester. What you will need to hand in by 5pm on 9/23 will have two parts:

- One-page summary of your idea that everyone in class will read (anonymously)
- Four-page elaboration of your idea for the professor only to read

Class members will read the one-page summaries from fellow students and together will select one project idea to implement. More instructions are available on Moodle.

## 2. Lab Report (15 + 25 points)

Each student is required to write an APA-style paper reporting the study that the class carries out. A draft of the introduction and methods (15 points) will be due in-class on 11/15. The professor will provide feedback on this draft. A final version of the paper (25 points), including abstract, introduction, methods, results, discussion, reference list, and figures (where appropriate) is due at the end of the final exam period.

## 3. Quizzes (20 points)

Two short quizzes will assess your comprehension of issues in EEG/ERP methodology and analysis. The quizzes will be self-scheduled (on your own time) during the weeks listed in the schedule.

## 4. Lab exercises (15 points)

In the second half of the semester, some class time will be used to learn hands-on data processing methods using Matlab/EEGLAB software. Students will hand in some results of these data-processing exercises completed in class.

## 5. Participation/Effort (5 points)

Effective group lab work requires that each student makes a contribution. This includes both intellectual contributions, such as helping to brainstorm ideas for the group project, and "good citizen" contributions, such as running your fair share of participants and helping to keep the lab clean and organized for others to use. Note also that hands-on activities usually cannot be made up if you miss class, so attendance is critical. Do let the professor know if you must miss class due to illness or other unavoidable conflict. Participation/effort will also be evaluated in the project presentation scheduled for 12/6.