**Instructor:** Dr. Craig McDonald **E-mail address:** [cmcdona3@gmu.edu](mailto:cmcdona3@gmu.edu)

**Teaching Assistant:** Paul Beatty **E-mail address:** pbeatty@masonlive.gmu.edu

**Class time:** T 4:30-7:10 pm

**Class location:** Robinson B102 **Office phone #:** 703-993-2277

**Office hours:** T 3:00-4:00 pm & by appt. **Office location:** DK 2057

**Recommended Text:** SJ Luck (2014) *An Introduction to the Event-Related Potential Technique*, *2rd Ed.*, MIT Press.

**Required Software:** None

**Deadlines:** Last Day to Add – January 28; Last Day to Drop – February 5

**Goals and Course Description:**

The primary goal of this course is to provide students with a fundamental understanding of how questions about human cognition can be investigated using electroencephalography (EEG) and the event-related potential (ERP) technique. There will be a strong emphasis on research methodology and data analysis, as well as discussion of EEG investigations of specific cognitive processes. A secondary goal will be to provide students with hands-on experience with EEG. Students will have the opportunity to analyze and interpret EEG/ERP data that they have collected. The course will introduce students to commercially available EEG analysis software, as well as open-source toolboxes.

**Assignments:**

**Discussion/Readings:**

All students must read the article/chapter(s) ahead of time and be prepared to take part in the class discussion. Your contribution to class discussions is a substantial part of your grade. To facilitate class discussion, each student will post, in advance, a question or comment on the assigned readings. The comment should be posted on the designated Blackboard discussion thread at least 24 hours prior to the date and time of the assigned discussion.

**Paper:**

Students will propose an experiment that will utilize EEG/ERPs. The proposed experiment should be aimed at providing new insight into an aspect of human cognition. The paper will take the form of an introduction and methods section of a scientific manuscript. Students are encouraged to propose an experiment that reflects their graduate research interest.

**Take Home Test:**

Students will answer a series of short answer questions. Some questions will address methodological aspects of EEG/ERP, whereas others will pertain to specific examples of how EEG/ERP has been applied to understand cognitive processes.

**EEG Practicum:**

Towards the end of the semester, students will form small groups and apply what they have learned during the course to collect, process and analyze EEG data. Students will be evaluated based on the degree to which they play an active role in data collection, as well as an analysis of the data they helped to collect (submission of an ‘analysis tree’ and appropriately plotted ERP data will be used to verify the analysis).

**Letter Grades:**

A (90-100%), A- (85-89%)

B+ (80-84%), B (75-79%), B- (70-74%),

C+ (65-69%), C (60-64%), C- (55-59%),

D (50-54%), F (below 50%)

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| --- | --- | --- |
|  |  |  |
|  | Paper | 30% |
|  | Take Home Test | 20% |
|  | EEG Practicum | 20% |
|  |  | |
|  | Class Discussions | 30% |
|  |
| **Total** |  | 100% |

**Grading:**

**Honor Code:**

Students are reminded of the university honor code and are expected to adhere to the principles thereof.

**Official Communications via GMU E-Mail:**

Mason uses electronic mail to provide official information to students. Examples include communications from course instructors, notices from the library, notices about academic standing, financial aid information, class materials, assignments, questions, and instructor feedback. Students are responsible for the content of university communication sent to their Mason e-mail account, and are required to activate that account and check it regularly.

**Class Cancellation Policy:**

In the event that class is cancelled, students will be notified via email. In addition, students will be notified if any changes are made to the course schedule.

**Policy Regarding Late Assignments**:

Permission to postpone an exam or to turn in an assignment late will only be given for very important and acute reasons. The student must obtain my prior consent to postpone an assignment or have written medical documentation for absence from a quiz or other assignment. Any documentation required for excused absences MUST be turned in by the following class.

**Technology Statement:**

Required knowledge of technology for this course includes ability to retrieve handouts sent via email to your GMU address or posted on Blackboard (mymason.gmu.edu). Occasionally I may use computer programs or the Internet in class to present demonstrations of relevant material.

**Special Needs:**

If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.

# Tentative Schedule:

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| --- | --- | --- |
| **Date** | **Reading** | **Topic** |
| Jan 21 | Luck Chapter 1 | Introduction |
| Jan 28 | Luck Chapter 2 | Neural Basis of EEG |
| Feb 4 | Luck Chapter 3 | Overview of Common ERP Components |
| Feb 11 | Luck Chapter 4 | Designing and Conducting ERP Studies |
| Feb 18 | Chapters 6, 7 & 8 | Signal Processing of ERPs |
| Feb 25 | Luck Chapters 9 & 10 | Quantifying and Statistically  Analyzing ERP Components |
| Mar 3 | Luck Chapter 8, Online Chapter 12 | Time Frequency Analysis of EEG |
| Mar 10 | Spring Break |  |
| Mar 17 | Luck Online Chapter 14 | ERP Component Localization |
| Mar 24 | EEGLab tutorial (pdf) | Software Packages for creating experiments and analyzing EEG data |
| Mar 31 | Brain Vision Analyzer Handout | ERP analysis tutorial |
| Apr 7 | EEG Data Collection Procedure Handout | EEG Practicum 1 |
| Apr 14 |  | EEG Practicum 2 |
| Apr 21 |  | EEG Practicum 3 |
| Apr 28 | Revisit Chapters 6, 7 & 8 | ERP Analysis Troubleshooting |

***\*\* NOTE:* You are responsible for all announcements and any syllabus modifications made in class each week whether you are present or not.**