RIDE THE WAVE! RESEARCH HOW THE BRAIN PROCESSES LANGUAGES
COURSE-BASED UNDERGRADUATE RESEARCH EXPERIENCE (CURE)
AND SPECIAL TOPICS IN LINGUISTICS
LIN4930/LIN6932

Time: Monday: 8:30-10:25AM
Wednesday: 9:30-10:25AM
Classroom: Weil 408E

Instructors: *@Dr. Eleonora Rossi (Principal Investigator)*
Office: 4127 Turlington Hall, eleonora.rossi@ufl.edu

EEG TAs
@Cesar Rosales, Ph.D. student, rosalesc@ufl.edu
@Megan Nakamura, Ph.D. student mnakamura@ufl.edu

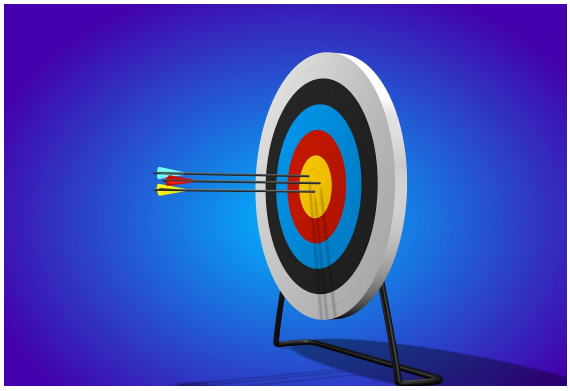
Office Hours: *By email appointment. Just send me an email.*
I encourage students to take advantage of office hours to discuss course content and get clarification. My default office hours are virtual via zoom. However, if you have a preference to meet in person, please email me for an in-person meeting.

Why virtual office hours?
1) Maximizes safety
2) No mask required
3) Can share screens
4) Group meetings
5) Join from any location!

Course rationale and objectives:

In this course, you will learn the bases of electroencephalography (EEG) and its applications to understand human cognition, and in particular how language is processed by the human brain, both for speakers of one language alone, and for speakers who live their lives with more than one language. The course will include both in person theory classes supplemented with state-of-the-art online material, and the basis of hands-on training to learn how to collect EEG data from human subjects in Dr. Rossi's EEG Brain, Language, and Bilingualism Lab (BLAB). Once trained, students will participate in a research project in BLAB, and will use their newly acquired expertise to collect EEG data from human participants, and will learn also the bases of EEG data analysis. This course will provide students with key theoretical and practical skills that will be foundational for anyone who is interested in developing future research in neuroscience.

Course Goals



Learning is a partnership between student and instructor.

Instructors design a course with particular learning goals in mind and endeavor to facilitate student learning.

Students come to class with personal goals for learning, and actively engage in and contribute to the learning process.

Instructor-designed learning goals:

On completion of this course, students should be able to:

- Describe how electrophysiological methods have contributed to our understanding of cognition and how it is used for practical applications in medicine and technology
- Explain conceptual aspects of electrophysiological recordings (e.g., source of the EEG signal, physical properties of ERP components, making inferences about cognitive associations).
- Analyze and evaluate primary research articles that use electrophysiology methods
- Demonstrate a basic level of competence with the technical aspects of EEG experimental design and data collection, and ability to correctly utilize an EEG equipment.
- Demonstrate basic proficiency to process, analyze and interpret EEG/ERP data

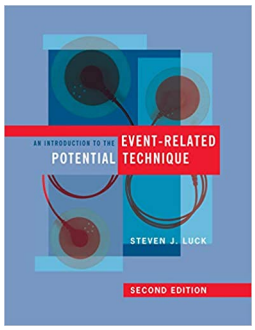
Your personal learning goals:

Following the course, I should be able to

COURSE RESOURCES

Assigned Readings:

Required readings consist of chapters, chapter excerpts, review articles and experimental reports that will be available on Canvas, mainly from Steve Luck's textbook.



RECOMMENDED Text for those who wish a more in-depth understanding

- Luck, S. J. An Introduction to the Event-Related Potential Technique, 2nd edition. MIT Press, 2014. ISBN 9780262525855. This is available as a Kindle text or in paperback from Amazon.
- Other useful resources:
- Handy, T.C. (2005). Event Related Potentials: A Methods Handbook. MIT Press: Cambridge, MA.
- Luck, S. J. & Kappenman, E.S. (2012) The Oxford Handbook of Event-related Potential Components. Oxford University Press: Oxford, Eng.
- Rugg, M.G.H & Coles (1995). Electrophysiology of mind: event-related brain potentials and cognition. Oxford University Press: Oxford, Eng.
- For free access and more advanced data analysis: https://socialsci.libretexts.org/Bookshelves/Psychology/Biological_Psychology/Applied_Event-Related_Potential_Data_Analysis_(Luck)

Other important resources

PURSUE WEBSITE: *https://pursue.richmond.edu/*
ERP BOOTCAMP*: https://erpinfo.org/*
THE BRAIN ATLAS: http://www.helpthereisabraininmyhead.com/brain-atlas

Canvas:

We will be relying heavily on Canvas for course readings, assignments, and for posting course-related information. Some assignments will also require you to upload materials through Canvas. If you have any questions regarding Canvas or would like a tutorial, please contact the UF's Canvas system.

When reading *review articles*, keep the following questions in mind:

- *What are the issues that the author considers to be central to the area?*
- *Why are electrophysiological techniques suited for addressing those issues?*
- *What aspects of the electrophysiological signal have been informative?*
- *What are typical electrophysiology designs for experiments in this area?*
- *What insights about cognitive neuroscience have been obtained?*

When reading *experimental reports*, keep the following questions in mind:

- *What is the research question?*
- *How does the experimental design address the question?*
- *What are the possible outcomes of the experiment and what would each mean (what are the experimental hypotheses)?*
- *What was the actual outcome?*
- *What are the authors' conclusions and what evidence in the paper supports this conclusion?*
- *How strong is the evidence? Are there any alternative explanations?*
- *What are some further questions and how might you address them?*

Course website:

Course materials (lecture notes, syllabus, etc.) and exercises will be made available on the course website on E-learning (elearning.ufl.edu). Current **deadlines and grades** will also be posted on the website. You are responsible for checking the site regularly and for letting the instructor know promptly if anything is unclear, or if your grade has been entered incorrectly.

Assessment:	*% of course grade (out of 100%)*
• Online and at home assignments	20%
• Midterm exam	20%
• Preprocessing labs	30%
• Final Portfolio	20%
• Participation and learning reflections	10%

GRADE CALCULATION:

Your final grade will be determined according to the following scheme:

92-100 = A	89-91.9 = A-	86-88.9 = B+	82-85.9 = B
79-81.9 = B-	76-78.9 = C+	72-75.9 = C	69-71.9 = C-
66-68.9 = D+	62-65.9 = D	58-61.9 = D-	Below 58 = E

For UF grading policies for assigning grade points, see:
https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Details of assessments

Assessment of learning

To be successful in this course, you should expect to devote an average of 10-14 hours each week to preparing for class, participating in class sessions, studying course related materials, and completing course assignments. Managing multiple courses takes good planning. To help with your planning, I have provided a schedule with assignment due dates, and I will provide reminders in the weekly Canvas folder. Due dates are tied to learning outcomes and because mastery of certain concepts and skills are required before moving forward, it is necessary to adhere to the schedule of assignment due dates. However, sometimes despite our best efforts, circumstances can make late assignments unavoidable (e.g., flu or cold, minor injury, heavy schedule, family event, forgetfulness). All students will be granted **one late assignment without penalty**, **provided it is turned in within 3 days of the original due date**. For second and following late assignments, a **penalty of 10% per day will be assigned**. If you have a serious illness or injury that requires you to miss **more than a week of consecutive classes**, please contact me to work out an arrangement for missed classes and work.

Participation and Learning Reflections (10%). Learning is not a passive activity. As much as possible, we will engage in active learning through discussions, reflections, and other class exercises designed to engage deeper thinking about a topic. Through these activities, you will also be able to contribute your own knowledge and experience to help you and others make connections that are meaningful. Class activities are also a great way to gage your grasp of the topic. Participation involves coming prepared to class, sharing your thoughts with your peers in table discussions, and engaging enthusiastically in class activities. Some activities require worksheets to be completed before class. Completed worksheets will contribute to your participation grade, based on good-effort completion. The course will also include periodic learning reflections. Studies show that student reflection results in deeper learning and longer retention. Self-reflection heightens an awareness of one's most effective learning strategies, as well as highlighting where one might devote more time and attention. Student reflections also provide helpful feedback to instructors to improve the course.

EEG data collection + homework (20%). Homework is designed to help you consolidate the information covered in the readings and in class. Homework will include two assignments that will be announced later on in class.

Homework (10%)

EEG data collection (10%): This will be a team assignment. You will use class time to collect 1 data set for an experiment and that data will later be used for data analysis.

Midterm Exam (20%). To assess your understanding of the conceptual foundations of the course, a midterm exam will be administered following the conceptual modules in the course. The format for this assessment will be online, and may consist of multiple-choice, short answer, essay, and diagram labeling questions.

Preprocessing Labs (30%). To gain the technical and analytic skills necessary to preprocess and analyze ERP data, the second half of the course will consist of data analysis labs. There will be 6 lab assignments in which you can demonstrate your knowledge and skills. Because these labs cover advanced concepts and technological skills, grading will be based on self-reflections of learning. That is, you will assess your own work based on an answer key. You will also reflect on your learning, noting any corrections that are necessary. I will then adjust your grade based on your learning reflections.

Specialty Software. Preprocessing labs rely on specialized software (MATLAB with specific toolboxes). There are 3 ways to access this software:

1. *The computers in our classroom (Weil 408E), and you will be able to access these computers whenever the room is not being used to teach classes.*
2. *You may purchase a student copy of Matlab for students (~$100). Once MATLAB is installed you should add all the necessary toolboxes that are required for EEG data analysis and for ERP lab.*

Final Portfolio (20%). There will be no final exam for this course. Instead, the final portfolio is an opportunity to showcase your learning in the course and to create a product that can be used to demonstrate your skills to potential employers or graduate program supervisors. Students will apply their learning to a class project that investigates how subclinical depression impacts attention among undergraduates. To answer this question, students will analyze a novel set of data from the PURSUE database and save the processing outputs following each lab. At the end of the semester, you will organize a portfolio of your project work, including the preregistration assignment, preprocessing files, data analysis files, and a brief write-up that interprets the data and makes a conclusion. You will also write a brief reflection of the knowledge and skills you gained in the course and how they might transfer to future career or life experiences. The portfolio is due during the scheduled final exam for the course (date: TBA).

In-class EEG training: All the hands-on EEG training will be compulsory. You will *receive information in class.*

Policy on working together: You are more than welcome to work together on homework assignments and the EEG training and testing,

Late policy and attendance: Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

Incorrect grades: It is your own responsibility to keep track of whether your grade has been entered correctly. If you think a grade for an assignment or test is missing or incorrect, please contact the instructor promptly.

Respect for others: Students are expected to behave in a manner that is respectful to the instructor and to fellow students. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all.

Accommodations for students with disabilities: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Health and wellness: If you or a friend is in distress, please contact umatter@ufl.edu or 352-392-1575 so that a U Matter We Care team member can reach out to the student in distress. In case of emergency, call 9-1-1.

Course evaluations: Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results/.

Schedule: *The following schedule is an estimate of the course's progress, with readings for the given week and approximate dates. The red dates designate the EEG LAB days, and days in which you may test (after the first half of the semester.*
****Please regularly consult the schedule on the course website for updates.*****

Dates	MODULE	Readings/Assignment(s)
Jan 8	Module 1: welcome + basic of EEG/ERP	
Jan 10	Module 1: welcome + basic of EEG/ERP	Submit student learning goals
Jan 15	Module 2-1: Fundamentals of ERP recordings Module 2-2: Source of EEG waveform	
Jan 17	EEG LAB TOURS with TAs	
Jan 22	Extra time if needed	Submit lab tour worksheet
Jan 24	Extra time if needed	
Jan 29	Module 7: Recording EEG	
Jan 31	Module 7: Recording EEG, capping	
Feb 5	EEG LAB DATA COLLECTION DEMO	Bring Capping procedure checklist and work through it during the visit
Feb 7	EEG LAB DATA COLLECTION DEMO	Bring Capping procedure checklist and work through it during the visit
Feb 12	Module 3: ERP components	
Feb 14	Module 3: ERP components	
Feb 19	Module 4: Language and ERPs	
Feb 21	Module 4: Language and ERPs	
Feb 26	Module 5: Experimental design	
Feb 28	Module 5: Experimental design	
March 4	Module 6: Programming EEG experiments	
March 6	Module 6: Programming EEG experiments	
March 11	SPRING BREAK	SPRING BREAK
March 13	SPRING BREAK	SPRING BREAK
March 18	EEG LAB DATA COLLECTION	Goal: collect 1 data set
March 20	EEG LAB DATA COLLECTION	Goal: collect 1 data set
March 25	EEG LAB DATA COLLECTION	Goal: collect 1 data set
March 27	EEG LAB DATA COLLECTION	Goal: collect 1 data set
Apr 1	Data analysis labs_1	
Apr 3	Data analysis labs_1	
Apr 8	Data analysis labs_2	
Apr 10	Data analysis labs_2	
Apr 15	Data analysis labs_3	
Apr 17	Data analysis labs_3	
Apr 22	Work on final portfolio	
Apr 24	Work on final portfolio	