

## METHODS IN NEUROIMAGING

### **Course Info**

**Course #:** PSY 6930 (3 credits)

**Location:** PSY 0191

**Times:** Thursdays: Period 5-7 (11:45am – 2:45pm)

**Canvas course website:** <https://ufl.instructure.com/courses/498369>

### **Instructor Info**

**Instructor:** Dr. Steven M. Weisberg

**Email:** [stevenweisberg@ufl.edu](mailto:stevenweisberg@ufl.edu)

**Phone:** 610-212-3113

**Office Hours:** Mondays, 11:30am-1:30pm or by appointment (email me)

Zoom link: <https://ufl.zoom.us/j/98379776447>

## INTRODUCTION

Magnetic resonance imaging (MRI) offers new and exciting ways to understand neural structure and function. This course will cover methods and techniques for analyzing MRI and fMRI data and how those tools lead to advances in our understanding of how the brain instantiates behavioral and cognitive representations. Part lecture, part journal club, and part project-focused, we will move beyond basic univariate analyses and learn, discuss, and implement the next generation of analytical approaches for investigating neuroscientific theories. Although we will cover the basics, the expectation is that students will come into the course with some familiarity of MRI and fMRI concepts and how to link those concepts with domain areas in their field.

### **COURSE GOALS**

By the end of this course, you will be able to:

1. Identify and describe the primary methods used to analyze structural and functional MRI data.
2. Understand and discuss those analytical approaches in empirical papers, specifically relating data-driven evidence to cognitive neuroscientific theories.
3. Develop practical and applied knowledge of MRI and fMRI analysis tools and build knowledge around open source datasets and resources.
4. Through group work, create an analysis plan and/or research proposal in written and oral form, using at least one of the techniques discussed in class.

### **SUCCESS IN THE COURSE**

Neuroimaging is a rapidly developing field with new data and insights coming all the time. Developing the ability to critically think about the material we are covering and how it inter-relates is the cornerstone of success. So, ask questions. Don't just attend class – participate; engage; bring your own insights.

### **PREREQUISITES**

Instructor permission.

## COURSE SCHEDULE

Topic	Date	Activity / Assignment
<b>The Basics:</b> Intro to MRI	January 11	Classmate speed dating
<b>The Basics:</b> Structural + Functional Data	January 18	Group initial discussions
<b>The Basics:</b> Tools of the Trade	January 25	Neuroimaging analysis playground
<b>Project Work:</b> Project discussions	February 1	<b>Final Project - Checkpoint 1:</b> Topic and Outline
<b>Structural Analyses</b>	February 8	Guest Lecture: Brad Wilkes (structural connectivity)
<b>Functional Analyses:</b> Representational Similarity	February 15	PyMVPA, COSMO MVPA
<b>Functional Analyses:</b> Deep learning + AI	February 22	<b>Final Project - Checkpoint 2:</b> Project definition and scope
<b>Functional Analyses:</b> Encoding Models	February 29	Project discussions
<b>Functional Analyses:</b> Functional Connectivity	March 7	Project discussions
NO CLASS - SPRING BREAK	March 14	NO CLASS - SPRING BREAK
<b>Functional Analyses:</b> Network Neuroscience	March 21	<b>Final Project - Checkpoint 3:</b> Intro + Methods
<b>Other:</b> Meta-analyses, rt-fMRI	March 28	NiMARE, NeuroSynth
<b>Project Work:</b> Project discussions	April 4	Project discussions
<b>Project Work:</b> Project discussions	April 11	Project discussions
<b>Final Presentations</b>	April 18	<b>Final Project - Final Deadline:</b> Full draft / analysis notebook

**Readings for each week will be posted on Canvas.**

## COURSE POLICIES

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found [here](#).

### ATTENDANCE

Synchronous attendance is required. A Zoom option will be provided but should only be used when in-person attendance is impossible.

That said, *do not attend in-person class sick*. A symptom's a symptom, no matter how small! If you have any symptoms, you are automatically excused from in-person attendance – no notice required.

### CHATGPT / AI WRITING ASSISTANTS

AI writing assistants are permitted for use in this course for use in coding or writing assignments. You must disclose the use of any such writing assistants in a disclosure statement. You should also note the following. 1) You are responsible for anything you turn in. Please realize that AI writing assistants confabulate – that is, they will authoritatively make up facts and citations. 2) Tech companies receive everything you enter as prompts. Be aware of this. 3) Research on how our thinking develops as a product of writing is a new ongoing area. My working hypothesis is that you lose some aspects of the thinking process by offloading writing to a bot. Your mileage may vary. 4) If you are planning on using this work for grants or paper submissions, some organizations may have stricter policies on this than I do.

### DIVERSITY AND INCLUSION

A disproportionate amount of cognitive neuroscience research was conducted by cisgender, heterosexual white men and later by white men and women. I have done my best to represent diverse authors, organizations, and topics, but I also acknowledge that there may be covert and overt bias in the material, and this limits our understanding of the concepts we will discuss. We will acknowledge this limitation throughout the course and do our best to bring in diverse thought.

### LATENESS AND MAKE-UP POLICY

Unexcused late assignments will receive 10% reductions per day off the total grade. (E.g., 1 hour late = 90% maximum grade; 1 day + 1 hour late = 80% maximum grade).

An assignment is considered late if it is submitted > 20 minutes past the deadline time. This grace period is provided for Canvas technical issues. If you cannot submit through Canvas, email the assignment to Dr. Weisberg, then submit via Canvas.

Permission to make up assignments and tests will be granted for university approved reasons and must include documentation as per university guidelines. If you have a university-approved request, please submit it in writing (over Canvas or UF email) to Dr. Weisberg in advance of the assignment/test.

## GRADING

Calculation of grades will be based on the following percentages. Point values on tests and rubrics may vary, so follow the percentages laid out here. More information on grades and grade policies [here](#).

### EVALUATION OF GRADES:

**Participation & Attendance (15%)**

**Empirical paper presentation (15%)**

**Final project (70%):** Topical proposal and outline (10%); Checkpoint 1 (25%); Checkpoint 2 (25%); Final report (25%); Final presentation (15%)

### Grading scale:

Grades will be rounded to the nearest point (.5+ rounds up to the nearest point).

		<b>A</b>	93+	<b>A-</b>	90-92
<b>B+</b>	86-89	<b>B</b>	83-85	<b>B-</b>	80-82
<b>C+</b>	76-79	<b>C</b>	73-75	<b>C-</b>	70-72
<b>D+</b>	66-69	<b>D</b>	63-65	<b>D-</b>	60-62
<b>F</b>	59 or less				

Example 1: Your grade is 85.4%. Does it round up to 86%? **NO**.

Example 2: Your grade is 85.6%. Does this round up to 86%? **YES**.

## GENERAL POLICIES / BOILERPLATE

### ACADEMIC CONDUCT / CHEATING

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with Dr. Weisberg.

Cheating is defined in the UF Handbook. If a student is caught cheating, the first offense will result in a zero for that exam and a record will be placed in a temporary file with the Office of Student Affairs. The second offense will result in an "E" for the course, and the student will go before the Honor Court.

### CLASS DEMEANOR

These guidelines hold in class and online, in public chat and private message. A fundamental part of science, learning, and communication is healthy debate. In fact, one goal of this course is for you to be able to mount and defend an oral argument in class. I want you to challenge each other's ideas. What this means

is, statements like “You’re wrong – and here’s why...” or “I disagree – I read that...” should be encouraged.

What this does not mean is that you have the right to challenge anyone in an inappropriate, emotional, or non-science related way. We will respect each other’s ideas, communications styles, and right to learn and express ourselves. The expectations of this course (and actually everywhere in life) are that you maintain respectful discourse *at all times*. If you are not sure where the line is between scientific debate and personal attack, lean toward the side of restraint and ask Dr. Weisberg about it later.

## **COURSE EVALUATIONS**

Help future students who take this class by filling out course evaluations online!

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluer.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## **DISABILITIES**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [www.dso.ufl.edu/drc](http://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.

## **EATING/DRINKING**

For in-person attendance, eating and drinking in class is strictly prohibited.

## **FOOD, SHELTER, AND OTHER MATERIAL NEEDS**

Any student who has difficulty accessing sufficient food to eat every day, or who lacks a safe and stable place to live, is urged to contact the Field and Fork Food Pantry or the Dean of Students Office for support. Furthermore, please notify me or one of your TAs if you are comfortable doing so. This will allow us to provide you with any resources we can.: Contact information for the Counseling and Wellness Center: 352-392-1575; and the University Police Department: 352-392-1111 or 9-1-1 for emergencies.

## **IN-CLASS RECORDING**

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal

or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

### **MENTAL HEALTH AND STRESS**

Diminished mental health, including significant stress, mood changes, excessive worry, or problems with eating and/or sleeping can interfere with academic performance. The source of symptoms might be related to your course work; if so, please speak with me. However, problems with relationships, family worries, loss, or others personal struggles can also contribute to decreased academic performance. The University of Florida provides cost-free mental health services through the Counseling and Wellness Center (CWC). Please seek help if you feel you need it.

### **MINIMUM TECHNOLOGY REQUIREMENTS**

This course requires adherence UF’s minimum technology requirements (recommendations [here](#)). These include a computer with webcam, microphone, speakers, and access to a stable internet connection.

### **SEXUAL HARRASSMENT**

Sexual Harassment is not tolerated in this class, in the Department of Psychology, or at the University of Florida. Sexual harassment includes: the inappropriate introduction of sexual activities or comments in a situation where sex would otherwise be irrelevant. Sexual harassment is a form of sex discrimination and a violation of state and federal laws as well as of the policies and regulations of the university. All UF employees and students must adhere to

UF's sexual harassment policy. Please review this policy and contact a university official if you have any questions about it. As mandatory reporters, university employees (e.g., administrators, managers, supervisors, faculty, teaching assistants, staff) are required to report knowledge of sexual harassment to UF's Title IX coordinator. You can also complete a Sexual Harassment Complaint Form.

## RESOURCES SUMMARY

Students in need of support have access to a wide variety of resources on campus. Below are some of the resources available. If you need anything during the semester, please reach out to me and I will do my best to connect you with resources.

### Health and Wellness

- **U Matter, We Care:** [umatter@ufl.edu](mailto:umatter@ufl.edu); 352-392-1575; <https://umatter.ufl.edu/>
- **Counseling and Wellness Center:** 352-392-1575; <https://counseling.ufl.edu/>
- **Student Health Care Center:** 352-392-1161; <https://shcc.ufl.edu/>
- **University Police Department:** 352-392-1111; <http://www.police.ufl.edu/>

### Academic Resources

- **E-learning technical support:** [support@ufl.edu](mailto:support@ufl.edu); 352-392-4357; <https://lss.at.ufl.edu/help.shtml>
- **Career Resource Center:** 352-392-1601; <http://www.crc.ufl.edu/>
- **Library Support:** <http://cms.uflib.ufl.edu/ask>
- **Teaching Center,** 352-392-2010; <http://teachingcenter.ufl.edu/>
- **Writing Studio,** 352-846-1138; <http://writing.ufl.edu/writing-studio/>

## VISUAL-AUDIO RECORDING STATEMENT

Our class sessions may be audio-visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate verbally are agreeing to have their voices recorded.

If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited. The following technology privacy policies are available [here](#).

Disclaimer: This syllabus represents my current plans and objectives. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, communicated clearly, are not unusual and should be expected.