



**Psychology 425: Introduction to Functional
Imaging of the Human Brain**

Units: 4

Term: Fall 2025

Day/Time: Tues, Thurs 11:00 – 12:50

**Location: Dornsife Neuroimaging Center Conference
Room (DNI 266)**

Instructor: Jonas Kaplan, Ph.D.

Office: 251 DNI

Office Hours: By appointment

Contact Info: jtkaplan@usc.edu

Course Description

Introduction to the physical and physiological bases of brain imaging, in particular, Magnetic Resonance Imaging (MRI), and principles of functional MRI, safety, design and analysis of experiments, and operation. The emphasis will be on practical issues related to using fMRI to answer psychological questions.

Learning Objectives

By the end of this course you should be able to:

- understand the basic physical and physiological principles that govern the generation of the fMRI signal
- understand how fMRI experimental design efficiency relates to the construction of optimal paradigms for investigating psychological functions
- understand why and how to apply basic preprocessing to neuroimaging data
- know how to apply the General Linear Model to analyze activation-based fMRI data using FSL and related tools
- have some familiarity with other techniques including functional connectivity analysis, independent components analysis, and multivoxel pattern analysis

Prerequisite(s): [PSYC 100Lg](#) and [PSYC 274Lg](#)

Co-Requisite (s): None

Concurrent Enrollment: None

Recommended Preparation: General familiarity with the command line

Course Notes

Lectures will focus on conceptual understanding and practical applications. The class will include a hands-on component in which the class will design an experiment and analyze data from a simple neuroimaging experiment.

Textbook

The textbook is "Functional Magnetic Resonance Imaging, Third Edition" by Scott Huettel, Allen W. Song, and Gregory McCarthy, published by Sinauer & Associates.

Description and Assessment of Assignments

The course consists of lecture and lab components. Students are required to pass safety training and participate in several group projects. There will be three mid-terms (no written final, but you must be present during the scheduled final exam

time for project presentation). Class grades will be assigned according to the following weights: Homework & Lab: 30%; Midterms I, II, III 15% each; Group Project with written report, 25%.

Technological Proficiency and Hardware/Software Required

A laptop computer is required. We will be learning how to use fMRI analysis software (FSL) which is freely available and can be installed on any modern laptop computer.

Grading Breakdown

Your grade will be based upon the weekly assignments and the final project.

Assignment	Points	% of Grade
Homework & Lab	30	30
Midterm 1	15	15
Midterm 2	15	15
Midterm 3	15	15
Final Project	25	25
TOTAL	100	100

Assignment Submission Policy

Assignments are due exactly when indicated by the syllabus and/or the instructor. Preferred method of submission is by email.

ONLINE Activities

SLACK: There will be a class Slack channel where we can talk, ask questions, etc. It is not a requirement to use Slack, but it is available if it is helpful.

Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Readings and Homework	Deliverable/ Due Dates
Week 1 1/14 1/16	(T) Introduction to the class and to fMRI (Th) MRI Safety, DNI policies, introduction to the control room	(T) Chapters 1 & 2	
Week 2 1/21 1/23	(T) Introduction to MRI Physics (Th) Basic principles of MRI signal and contrast	(T) Chapter 3, 4 (conceptual path) (Th) Chapters 6 & 7	
Week 3 1/28 1/30	(T) MRI Physics continued (Th) Intro to neurophysiology: Hemodynamics, BOLD signal and its relation to neural activity		
Week 4 2/4 2/6	(T) Spatial and temporal properties of BOLD signal (Th) Midterm 1	(T) Chapter 7 (Th) Chapter 9	Midterm 1
Week 5 2/11 2/13	(T) Lab 1: Block design (Th) Experimental design 1, General linear model	(T) Chapter 10	

Week 6 2/18 2/20	(T) fMRI data analysis 1: Intro to preprocessing (Th) Signal and noise of fMRI; functional data preprocessing	(T) Chapter 8	
Week 7 10/8 10/10	(T) Lab 2: Event-related design (Th) Introduction to the General Linear Model	(Th) Chapter 10	
Week 8 2/25 2/27	(T) Introduction to FSL, general workflow, file management, anatomical processing, segmentation (Th) Single-session GLM analysis		
Week 9 3/4 3/6	(T) Region of interest analysis (Th) Project proposal presentation		Project Proposals Presented
Week 10 Dates 3/11 3/13	(T) ROI analysis continued, multi-session group analysis (Th) Midterm 2		Midterm 2
SPRING RECESS, NO CLASS 3/18 3/20	(T) Functional connectivity (Th) Midterm review; Introduction to		

	resting state analysis		
Week 11 3/25 3/27	(T) Resting state fMRI Data analysis lab, seed based Seed connectivity lab cont'd (Th) Resting state connectivity, ICA lab		
Week 12 4/1 4/3	(T) Reading and writing about fMRI - COBIDAS, how to make figures (Th) Finish reading fMRI papers, Nonparametric Stats,		
Week 13 4/8 4/10	(T) Introduction to MVPA (Th) MVPA continued		
Week 14 4/15 4/17	(T) Brain networks (Th) Networks cont'd		
Week 15 4/22 4/24	(T) Naturalistic fMRI (Th) Advanced topics: Looking to the future		

Week 16 4/29 5/1	(T) Exam review (Th) Midterm 3		Midterm 3
5/6	Final project presentations		

Statement on Academic Conduct and Support Systems

Academic Integrity

The University of Southern California is foremost a learning community committed to fostering successful scholars and researchers dedicated to the pursuit of knowledge and the transmission of ideas. Academic misconduct is in contrast to the university's mission to educate students through a broad array of first-rank academic, professional, and extracurricular programs and includes any act of dishonesty in the submission of academic work (either in draft or final form).

This course will follow the expectations for academic integrity as stated in the [USC Student Handbook](#). All students are expected to submit assignments that are original work and prepared specifically for the course/section in this academic term. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s). Students suspected of engaging in academic misconduct will be reported to the Office of Academic Integrity.

Other violations of academic misconduct include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

Academic dishonesty has a far-reaching impact and is considered a serious offense against the university. Violations will result in a grade penalty, such as a failing grade on the assignment or in the course, and disciplinary action from the university itself, such as suspension or even expulsion.

For more information about academic integrity see the [student handbook](#) or the [Office of Academic Integrity's website](#), and university policies on [Research and Scholarship Misconduct](#).

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment or what information requires citation and/or attribution.

AI is not permitted

This course aims to develop creative, analytical, and critical thinking skills. Therefore, all assignments should be prepared by the student working individually or in groups. Students may not have another person or entity complete any substantive portion of the assignment. Developing strong competencies in these areas will prepare you for a competitive workplace. Therefore, using AI-generated text, code, or other content is prohibited in this course, will be identified as plagiarism, and will be reported to the Office of Academic Integrity.

Course Content Distribution and Synchronous Session Recordings Policies

USC has policies that prohibit recording and distribution of any synchronous and asynchronous course content outside of the learning environment.

Recording a university class without the express permission of the instructor and announcement to the class, or unless conducted pursuant to an Office of Student Accessibility Services (OSAS) accommodation. Recording can inhibit free discussion in the future, and thus infringe on the academic freedom of other students as well as the instructor. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Distribution or use of notes, recordings, exams, or other intellectual property, based on university classes or lectures without the express permission of the instructor for purposes other than individual or group study. This includes but is not limited to providing materials for distribution by services publishing course materials. This restriction on unauthorized use also applies to all information, which had been distributed to students or in any way had been displayed for use in relation to the class, whether obtained in class, via email, on the internet, or via any other media. Distributing course material without the instructor's permission will be presumed to be an intentional act to facilitate or enable academic dishonesty and is strictly prohibited. ([Living our Unifying Values: The USC Student Handbook](#), page 13).

Support Systems

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. [The Office of Student Accessibility Services](#) (OSAS) is responsible for the

determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Student Financial Aid and Satisfactory Academic Progress:

To be eligible for certain kinds of financial aid, students are required to maintain Satisfactory Academic Progress (SAP) toward their degree objectives. Visit the [Financial Aid Office webpage](#) for [undergraduate](#)- and [graduate-level](#) SAP eligibility requirements and the appeals process.

Support Systems:

[Counseling and Mental Health](#) - (213) 740-9355 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

[988 Suicide and Crisis Lifeline](#) - 988 for both calls and text messages – 24/7 on call

The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline consists of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

[Relationship and Sexual Violence Prevention Services \(RSVP\)](#) - (213) 740-9355(WELL) – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

[Office for Equity, Equal Opportunity, and Title IX \(EEO-TIX\)](#) - (213) 740-5086

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

[Reporting Incidents of Bias or Harassment](#) - (213) 740-2500

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

[The Office of Student Accessibility Services \(OSAS\)](#) - (213) 740-0776

OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

[USC Campus Support and Intervention](#) - (213) 740-0411

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

[Diversity, Equity and Inclusion](#) - (213) 740-2101

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

[USC Emergency](#) - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

[USC Department of Public Safety](#) - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call

Non-emergency assistance or information.

[Office of the Ombuds](#) - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

[Occupational Therapy Faculty Practice](#) - (323) 442-2850 or otfp@med.usc.edu

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.