

Psychology 610: fMRI Methods in Psychology

Winter 2014, LISB 317, Wednesday, 1:00-2:50pm

Instructor Information

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Course overview

Welcome to what we hope will be one of the most enjoyable educational experiences of your graduate school career. We will be learning fMRI image acquisition, analysis, and communication. By the end of the quarter, we hope that you will be an informed consumer of fMRI research, and have the skills to design and analyze a simple fMRI experiment on your own. This will be accomplished through a combination of readings, stimulating in-class discussions, critical writing, hands-on data collection, and a project where you will work with others to gather and analyze some actual fMRI data. Be prepared for frustration, confusion, and a whole lotta fun. Be prepared to learn.

This course has several goals:

1. To teach you to design an fMRI experiment, and collect and analyze fMRI data
2. To help you become a better consumer of fMRI research
3. To develop your critical thinking in reading and writing empirical papers

Required Texts

- Poldrack, R.A., Mumford, J.A., & Nichols, T.E. (2011). *Handbook of Functional MRI Data Analysis*. New York, NY: Cambridge University Press. (“PMN”)
- Selected articles to be distributed on the course webpage at: <http://blackboard.uoregon.edu>
 - Many from: Huettel, S.A., Song, A.W., & McCarthy, G. (2009). *Functional Magnetic Resonance Imaging, 2nd Ed.* Sunderland, MA: Sinauer Associates. (“HSM”)

Required Software

- MATLAB (or access to a computer with it)
- SPM12 (beta) for fMRI
- FSLview (available on Blackboard)

Course Organization and Requirements

Class meetings

The weekly meetings will consist of a combination of light lecturing and discussion of the material for the week. Attendance and participation counts for 20% of your class grade. The material in the lectures will not exactly match the material in the text, as we will be incorporating methodological

advances from recent and/or unpublished research that is on the bloody cutting edge of the field. That being said, the topics we cover will generally mirror those in the text. We strongly recommend that you read the assigned readings *before* class, as they will give you a solid introduction and framework to understand the lecture material. In addition to lectures, there will occasionally be in-class demonstrations to help illustrate the topics or methods we will be studying. Finally, we very much encourage discussion and questions during the lectures. You are encouraged to participate in course discussions and to interrupt us in order to ask a question or to share an insight.

fMRI Project

We firmly believe that you cannot learn to do fMRI totally in the abstract without actually doing it. The UO Lewis Center for Neuroimaging (LCNI) has generously donated scanner time to enable our class to practice scanning in small groups (4 people per group). During this course, you will **design and run an fMRI study on a topic to be decided by the class**. We will distribute more information about the project in Week 3 once we have covered fMRI study design, but here is an overview.

From Week 3 through Week 5, you will design an fMRI “study” to be run on a single subject in your group. A **one-page proposal** (ungraded) is due in Week 5 so that we can approve your design. During the next two weeks you and your group will go acquire data on that subject at LCNI. Next, you will practice preprocessing and analyzing the data on the single subject, due in Week 8. Immediately after that, the data from all groups will be made available to everyone for group-level analysis. Finally, you will present your findings as a group on the last day of class in Week 10.

Although you will work in groups to design your study, as well as to collect and analyze the data, your grade for the project will be based on (a) your **individual write-up** of the project (each group member must write his/her own methods/results section) and (b) the quality of the **20-minute group presentation** on the last day of class. The write-up will be a **six-page methods and results section** describing your first- and second-level model, with **up to two extra pages of figures and tables**.

Paper critique

Another primary goal of this course is for you to become a knowledgeable and informed consumer of neuroimaging research. Toward the end of the quarter, you will have a chance to practice this skill in writing by constructing a **three-page critique of an fMRI paper in your field**. You may choose your own paper, but it must be approved by one of us before the end of Week 10. More information about this project will be provided in Week 4.

Grading

Project write-up: 40%

Paper critique: 40%

Participation: 20%

Due dates for each assignment are listed in the schedule below. All assignments are due at the beginning of class. Late assignments will not be accepted.

Policies

Cheating/plagiarism. Don’t do it! You’re missing the point of graduate school if you do. Enough said – but if you have *any* questions about this please come talk to us.

Students with special needs. The UO works to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in disability-related barriers to your participation, please notify us as soon as possible. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

Lecture/Assignment Schedule

Week	Date	Topic	Reading	Assignment due
1	Jan 8	Welcome! Overview and introductions	Logothesis, 2008 (on Bb) PMN, Chapter 1	
2	Jan 15	Experimental Design	HSM, Chapter 9 (on Bb)	
3	Jan 22	MR physics (w/ Jolinda Smith)	HSM, Ch. 3-5 (on Bb) Hanson, 2008 (on Bb)	
4	Jan 29	Preprocessing	PMN Chapters 3-4	
5	Feb 5	First-level analysis	PMN Chapter 5	Design proposal
6	Feb 12	Second-level analysis	PMN Chapters 6-8	
7	Feb 19	Visualization / Reporting	PMN Chapter 10	
8	Feb 26	Advanced topics & Independent components analysis (w/ Moore & Hill)	TBD	First-level analysis
9	Mar 5	Neuroanatomy & Structural methods (w/ Giuliani & Alberti)	TBD	
10	Mar 12	Group project presentations		Project write-up
Finals	(no class)	Paper critique due March 19 at 5pm		