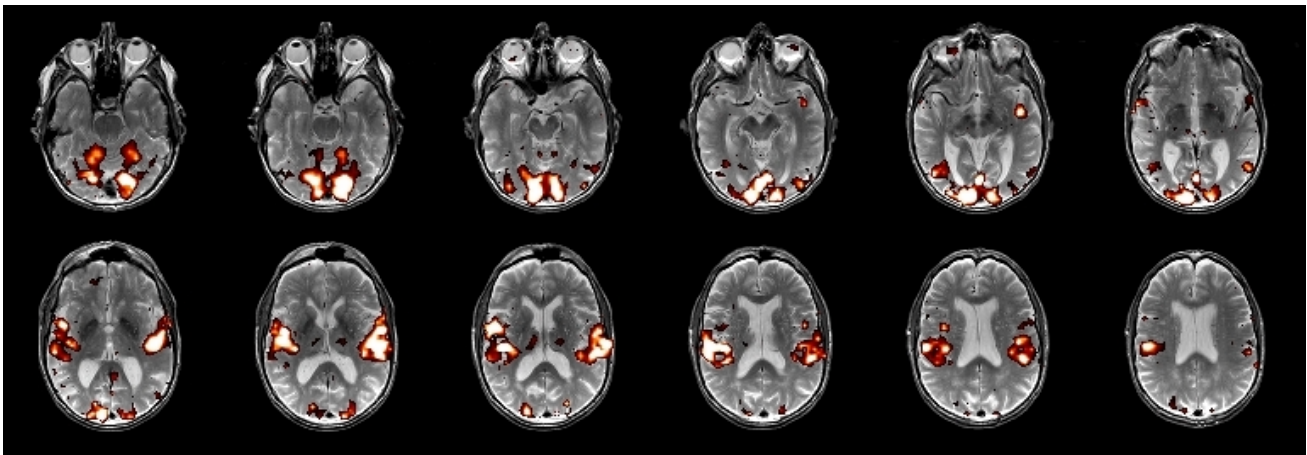


BioE 227/Rad 227: Functional Magnetic Resonance Imaging Methods

3 Credits Winter 2018 Course Syllabus

Professor Gary Glover
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office hours: by appt.



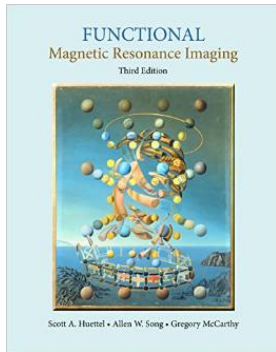
Lectures: Tue 1:00 – 2:20 PM, Fri 10:00 – 11:20 AM (Lucas P083)

TA: Patricia Lan, pslan@stanford.edu, office hours: Tues. 2:30-3:30 PM (Lucas P064-e)

Course Goals: Students will learn the methods of functional magnetic resonance neuroimaging, including data acquisition, analysis and experimental design. Material will emphasize the physics and neurobiology of functional imaging, and include the principles underpinning tradeoffs that occur in acquisition and design. The course will demonstrate applications in both cognitive neuroscience and clinical medicine. Multimodal imaging and neuromodulatory methods will be discussed. Even your mom would enjoy it!

Prerequisites: Some basic knowledge of physics and mathematics will be helpful. Some homework problems require simple Matlab programming. If in doubt contact prof.

Course description: There will be two sessions each week, comprising lectures, journal club presentations, labs and homework discussion. For each lecture, there will be assigned reading from text (below) as well as homework problems. During journal club, students will present articles relating to the lectures. Students not presenting will be required to read a relevant article and email the TA with 3 questions or comments about the article. In the lab sessions, students will gain hands-on experiences in fMRI acquisition and basic task analysis. The final project will involve proposing an fMRI experiment in the style of a short NIH-type fellowship grant.



Book: Required text available at the bookstore: Scott A. Huettel, Gregory McCarthy, Allen W. Song. **Functional Magnetic Resonance Imaging**. 3rd Edition (or previous) Cost: ~\$95.

Course website: canvas.stanford.edu, BIOE 227/Rad 227. Homework assignments and weekly articles will be posted on the website.

Grading: 60% Reading, Lab & Homework, 40% Final Project

Lectures and Readings

DATE (Tuesdays)	SUBJECT	Chapter reading from book	Section Reading Topics or Labs of this week *
1. 1/9	Course intro and NMR	1, 3	1 NMR phenomenon and EPI (by instructor)
2. 1/16	MRI	4, 5	2 MRI, physics of BOLD
3. 1/23	Hardware	2	3 MRI Hardware, Safety
4. 1/30	BOLD contrast	6, 7	4 Neurobiology of BOLD
5. 2/6	Spatial/Temporal Tradeoffs	7,8	5 Spatiotemporal resolution of BOLD
6. 2/13	Functional SNR/CNR Tradeoffs	7,8	6 LAB (fMRI acquisitions)
7. 2/20	Physiological Noise	8	7 Preprocessing Considerations
8. 2/27	Experimental design	9	8 HRF Linearity & Experimental Design
9. 3/6	Statistical Analysis I	10	9. Statistical Analysis
10. 3/13	Statistical Analysis II	11	Project Proposals
11. 3/23	Final Project due		

* Section reading articles relating to the listed topics can be found on the course website.