Fall 2015

SOMI-277A: Functional Magnetic Resonance Imaging: Methods and Analysis
(*** Note: we have a new course number)

Time and dates: Tuesday and Thursday 2:00-3:20pm, September 24 thru December 3, 2015
Location: Conference room, Center for functional MRI (building #822 on campus maps)
Course website: learnfmri.ucsd.edu
Organizer: David Dubowitz (dubowitz@ucsd.edu)
Other Faculty: Rick Buxton, Frank Haist, Tom Liu, Don Hagler

Overview: This course aims to provide an introduction to functional neuroimaging. Students will gain a grounding in the fundamental physical principles of magnetic resonance imaging, the underlying neurochemistry and energetics that make functional neuroimaging possible, and will learn how functional MRI can provide insights into neural physiology and cognitive function. The course will include hands-on tutorials with an introduction to using MRI scanners, so that students will understand how MRI and fMRI data are generated and can be assessed for quality. The latter half of the course introduces fMRI experimental design and analysis. This will include design and analysis assignments and several open discussion forums to provide practical experience in addition to the lecture format.

Organization: The course comprises teaching videos, reading and problem sets that students are expected to complete before each class. Classes are held twice per week, and consist of didactic lecture, discussion sessions and group problem solving. The class sessions provide a forum to explore many of the underlying concepts in more detail that build on the pre-class assignments. In addition, the course also includes two hands-on labs for acquisition and analysis of MRI & fMRI data, with an introduction to using MRI scanners. Pass/Fail grade is based on homework, attendance at lectures and labs, and participation in discussions.

Attending the course: There are no prerequisites for this course. We encourage students to register for the course, but in addition we welcome UCSD researchers and faculty who would like to attend as well.

Syllabus (subject to change):

#	Date	Faculty	Topic
1	Th 9/24/15	Dubowitz	Introduction & historical overview: Functional MRI & other imaging techniques
2	Tu 9/29/15	Buxton	Introduction to functional MRI
3	Th 10/1/15	Buxton	Basic Physics of Nuclear Magnetic Resonance
4	Tu 10/6/15	Buxton	Basics of Magnetic Resonance Imaging
5	Th 10/8/15	Liu	Image acquisition: methods, artifacts and noise
6	Tu 10/13/15	Dubowitz	Introduction to the MRI scanner and MRI Safety
7	Th 10/15/15	Dubowitz	Image Contrast
8	Tu 10/20/15	Dubowitz	Diffusion Imaging
9	Th 10/22/15	Buxton / Dubowitz	Review of Magnetic Resonance Imaging
	10/20–10/23	Dubowitz	*MRI Lab (I): MRI Data Acquisition.* *Introduction to prescanning, image contrast, diffusion, SNR, artifacts*
10	Tu 10/27/15	Buxton	Brain Energy Metabolism and Blood Flow
11	Th 10/29/15	Buxton	Nature of the BOLD signal
12	Tu 11/3/15	Haist	Essentials of fMRI Experimental Design & Data Collection
13	Th 11/5/15	Haist	Analysis of Individual Data
	11/3–11/6	Dubowitz	*MRI Lab (II): fMRI Data Acquisition.* *Set up and run EPI BOLD acquisition with physiological data & B0 field map*
14	Tu 11/10/15	Haist	Analysis of Group Data
15	Th 11/12/15	Hagler	Advanced Analysis and Presentation of fMRI Results
16	Tu 11/17/15	Haist	Functional Connectivity I
17	Th 11/19/15	Haist	Functional Connectivity II
18	Tu 11/24/15	Haist / Hagler	Review of fMRI Design and Analysis
	Th 11/26/15	***Thanksgiving Holiday****	
19	Tu 12/1/15	Buxton	Interpretation of the BOLD Signal
20	Th 12/3/15	Haist	fMRI Applications Papers