Class Syllabus
for
PSY 992, Section 601: Seminar in Psychology
Introduction to Functional Magnetic Resonance Imaging
Credits: 3
Instructor: David C. Zhu, Ph.D. (email: zhuda@msu.edu)
Associate Professor of Psychology and Radiology

Semester offered: Spring 2013

Class meeting days and times:
Tuesday and Thursday: 10:20-11:40 AM

Meeting locations: 346 Giltner Hall

Tentative office hours: Tuesday and Thursday: 12 PM - 1 PM

Prerequisites: (1) Graduate students, (2) college-level calculus, basic statistics, and (3) user-level computer skills and being comfortable of gaining user-level Linux skills in two weeks. (4) With the consent of the instructor, undergraduates are allowed to take this class as PSY 490 or talk to the instructor.

Text Book: Functional Magnetic Resonance Imaging, Second Edition, by S. A. Huettel, A. W. Song, & G. McCarthy. Sunderland, MA: Sinauer Associates. 2008.

This class will be taught in three formats:
(1) Lecture/Discussion,
(2) hand-on experience on fMRI experiment design, paradigm implementation, data collection, and data analysis, and
(3) some introduction to the usage of the GE 3T MR research scanner.

Topics to be covered: MR safety, the physics of MRI and fMRI, fMRI physiology, applications, paradigm design and data analyses, introduction to AFNI (a common software package for fMRI data analysis), and E-Prime programming.

E-Prime programming will be taught by Mr. David McFarlane.

Grading will be based on:
(1) Attend Lecture/Discussion sessions. (10%)
(2) Attend Lab sessions. (10%)
(3) Homework assignments. (50%)
(4) Project: Students will help to design and implement an fMRI project. Pilot data will be collected during the course of this study. Students will analyze and summarize the results as their final project. (30%)

Introduction to Functional Magnetic Resonance Imaging
Class Schedule (tentative)
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Lecture		Lab	
Date	Topic	Date	Topic
1/8/13	(1) General introduction to MRI and fMRI. (2) MRI Safety.	1/10/13	Lab group organization; Linux introduction.
1/15/13	MRI physics	1/17/13	Hand-on experience with AFNI
1/22/13	MRI physics (continued)	1/24/13	(1) MRI physics (continued). (Lecture) (2) Echo planar imaging
1/29/13	Neurophysiology and the mechanisms of BOLD	1/31/13	Linear system and fMRI experimental design (Lecture)
2/5/13	Block design with example	2/7/13	AFNI scripts for block design.
2/12/13	Single-subject data analysis for block design: Data prep-processing and deconvolution analysis	2/14/13	AFNI scripts for single-subject data analysis for block design
2/19/13	E-Prime programming for fMRI	2/21/13	E-Prime exercise and project
2/26/13	Group data analysis for block design: voxel-based group analysis	2/28/13	Group data analysis for block design
3/5/13	Spring Break	3/7/13	Spring Break
3/12/13	Simultaneous inferences (cluster analysis)	3/14/13	Cluster analysis
3/19/13	ROI analysis	3/21/13	ROI analysis
3/26/13	Event-related design with example	3/28/13	Scripts for event-related design.
4/2/13	Single-subject data analysis for event-related design: Data prep-processing and deconvolution analysis	4/4/13	AFNI scripts for single-subject data analysis for event-related design.
4/9/13	Group data analysis for event-related design: voxel-based group analysis and ROI analysis	4/11/13	Scripts for group data analysis for event-related design.
4/16/13	Resting-state fMRI	4/18/13	Resting-state fMRI data analysis
4/23/13	Diffusion tensor imaging	4/25/13	To be arranged.