

## NSCI-521: Elements of Imaging

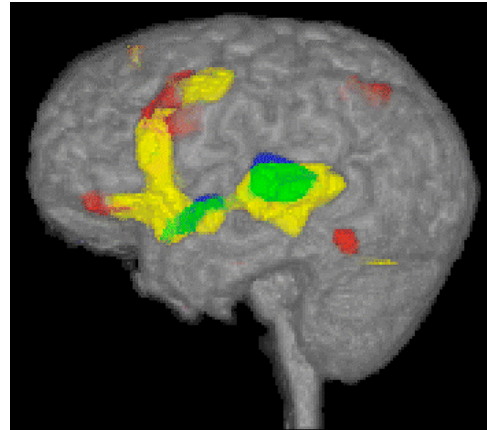
Fall 2007

Date/Time: Tuesdays, 10am to 11:50am

Location: TBD

Textbook: **Functional Magnetic Resonance Imaging**, Huettel, et al.

Course Director: **John Van Meter, Ph.D.**



Functional brain imaging techniques are important tools for both neuroscientists and clinicians. In this course we will focus on functional MRI with an emphasis on understanding the relationship between the underlying neuronal changes and the signal changes measured using fMRI. Other topics will include experimental design, fMRI data analysis, and interpretation of results. We will also discuss the application of this technique to clinical and neuroscience research.

The course will include both lectures and hands-on labs. Students will conduct and participate in an fMRI experiment that will include design, implementation, data acquisition and data analysis. A project report will be required and include review of pertinent neuroscience literature, discussion of the methodological issues covered during the lectures and presentation and analysis of the experimental findings. There will be mid-term and final examinations to assess the students' general understanding of the material covered in these lectures. The mid-term exam will compose 30% of the final grade, the final exam 30%, and the project report 40%. The course is open to both graduate and undergraduate students.

### Syllabus:

September 4 <sup>th</sup>	Introduction to fMRI
September 11 <sup>th</sup>	Principles of Magnetic Resonance Imaging
September 18 <sup>th</sup>	MR Image Formation and MR Contrast
September 25 <sup>th</sup>	Neuronal Processing and Hemodynamics
October 2 <sup>nd</sup>	BOLD fMRI and Neuronal Activity
October 9 <sup>th</sup>	Properties of the BOLD fMRI Signal
October 16 <sup>th</sup>	Experimental Design
October 23 <sup>rd</sup>	Data Analysis: Pre-processing
October 30 <sup>th</sup>	<i>Lab</i> : Collect fMRI Data for Student Experiments
November 6 <sup>th</sup>	Mid-term Exam
November 13 <sup>th</sup>	<i>Lab</i> : Pre-processing of Student Data
November 20 <sup>th</sup>	Data Analysis: Statistical Analysis
November 27 <sup>th</sup>	<i>Lab</i> : Statistical Analysis of Student Data
December 4 <sup>th</sup>	Interpreting fMRI Data, Future Directions
December 11 <sup>th</sup>	Review ( <i>optional</i> )
December 18 <sup>th</sup>	Final Exam and Project Reports Due