Course Organizer: Amanda Bischoff-Grethe, Ph.D.
Office: 8939 Villa La Jolla Dr. Rm. 234
Phone: 858-246-0604
Email: agrethe@ucsd.edu
Course Time/Place: TuTh 2:00 – 3:20 PM
Center for Functional MRI Conference Room (W.M. Keck Building)

Course Overview: Functional magnetic resonance imaging (FMRI) is an essential tool for the study of brain activity correlates to sensory, perceptual, and cognitive functions. This course aims to provide a solid foundation in FMRI experimental design and analysis sufficient to allow the student to conduct and report high-quality research using FMRI. The course is targeted to students new to FMRI research or those students with some experience in FMRI research that are seeking a deeper understanding of the various options available for analysis of FMRI data. The course will include multiple design and analysis assignments and several open discussion forums to provide practical experience in addition to the lecture format. The course will primarily focus on the use of the AFNI suite of programs for data analysis and visualization. Other software tools will be discussed where practical (e.g., FSL, SPM).

Teaching Faculty: Amanda Bischoff-Grethe, Ph.D., Richard Buxton, Ph.D., David Dubowitz, M.D., Ph.D., Lisa Eyler, Ph.D., Christine Fennema-Notestine, Ph.D., Frank Haist, Ph.D., Tom Liu, Ph.D., Christina Wierenga, Ph.D.

TA: TBA
Office hours: TBA

Prerequisites: SOMI 276A, COGS 276, BENG 280A, or equivalent

Spring Quarter 2009 Course Schedule:

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<td>1</td>
<td>Tu 03/31/09</td>
<td>Bischoff-Grethe</td>
<td>Introduction &amp; Overview</td>
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<td>2</td>
<td>Th 04/02/09</td>
<td>Buxton</td>
<td>Introduction to FMRI: Neural activity, energy metabolism,</td>
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<td>and blood flow</td>
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<td>READINGS: HS&amp;M: Chapters 1-6</td>
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<td>WEEK 2</td>
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<td>3</td>
<td>Tu 04/07/09</td>
<td>Haist</td>
<td>Fundamentals of Blocked and Event-related FMRI Designs</td>
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<td>Th 04/09/09</td>
<td>Liu</td>
<td>Blocked and Event-related designs: Efficiency &amp; Power</td>
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<td>5</td>
<td>Tu 04/14/09</td>
<td>Dubowitz</td>
<td>Essential Issues in FMRI Sequence Selection &amp; Safety</td>
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<td>Th 04/16/09</td>
<td>Team</td>
<td>Review and Discussion</td>
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WEEK 4
7 Tu 04/21/09 Bischoff-Grethe Preprocessing FMRI Data for Statistical Analysis
8 Th 04/23/09 Bischoff-Grethe Registration to Common Space

WEEK 5
9 Tu 04/28/09 Bischoff-Grethe Analysis of Individual Data: Block Designs
10 Th 04/30/09 Bischoff-Grethe Analysis of Individual Data: Event-related Designs

WEEK 6
11 Tu 05/05/09 Eyler Analysis of Group Data I
12 Th 05/07/09 Bischoff-Grethe Group Analysis Using FSL & SPM

WEEK 7
13 Tu 05/12/09 Eyler Analysis of Group Data II
14 Th 05/14/09 Team Review and Discussion

WEEK 8
15 Tu 05/19/09 Fennema-Nolestine Region of Interest Analysis
16 Th 05/21/09 Haist Automating Tasks Through Scripting

WEEK 9
17 Tu 05/26/09 Buxton Arterial Spin Labeling I
18 Th 05/28/09 Wierenga Arterial Spin Labeling II

WEEK 10
19 Tu 06/02/09 Haist Functional Connectivity Analysis
20 Th 06/04/09 Haist & Team Functional Connectivity Analysis & Discussion

Textbooks (UCSD Bookstore orders these on a “special order” basis. Place order with them):

Recommended Texts:

Course Work and Grading:
Work: The course will include multiple (weekly) homework assignments. A final paper is required.
Grading: 30% attendance & participation, 50% weekly assignments, 20% final paper.

Homework:
Homework will be assigned weekly, or nearly so. The assignments will be posted on the course website (http://learnfmri.ucsd.edu/) by noon on Friday. Assignments are due by noon the following Tuesday. Each assignment is expected to require approximately one to two hours to complete and will provide a practical tutorial...
on the material covered in the previous lectures or ancillary material useful to the material presented in the previous lectures. The homework assignments will require the student to have a working account on the course server to access relevant data and analysis tools.

**Final Paper:**

The final paper will consist of a Methods and Results section for an analysis of data provided in Week 8. You will be required to design the analysis pathway for individual and group data, describe this analysis in a Methods section, and present the results of the group analysis, with figures and tables as needed, in the Results section. The paper is due by 12:00 PM on the Tuesday following the final day of class (due June 9). Details regarding the assignment are requirements will posted on the course website and/or discussed in lecture.

**Note:** This course syllabus provides a general plan for the course. Deviations from this plan may be necessary. Such deviations will be discussed in lecture.