PSYCH 545: ADVANCES IN COGNITION/PERCEPTION
ADVANCED PRACTICALS OF FMRI

Fall 2022
3 Credits
Meets once weekly in person for 3 hours
SLN XXXX

Instructor

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Office Hours: By appointment.

Course Description

Functional MRI (fMRI) has become one of the core experimental methods in cognitive neuroscience and other fields of psychology. This course will provide theoretical and practical training for graduate student researchers to operate an MRI scanner and collect data. Topics will include: MRI physics, MRI safety, best practices in practical aspects of scanning subjects, scanning parameters, data quality control, and operation of a Siemens MRI console. The course will consist mostly of hands of workshops sessions at the Center for Human Neuroscience working with the Siemens Prisma 3T MRI system. Students will receive hands on training in safety screening, loading participants in/out of the scanner, operation of the MRI console, peripheral equipment, and safety procedures. At the end of this course students should be close to qualifying for Level 3 Operator status as the Center for Human Neuroscience. Students should ideally have some previous experience with MRI research.

Course Website

The full course website can be accessed with your CMU ID via: http://www.cmu.edu/blackboard
A public website will be made available with schedule information only.

Recommended Texts

There is no required text for the course. However it might be helpful to have or have access to *Functional Magnetic Resonance Imaging (3nd Edition)* by Huettel, Song, McCarthy (ISBN: 0878936270), and *Statistical Analysis of fMRI Data* by Ashby (ISBN: 0262015048). Other readings will be made available on the course website.

Course Objectives

- To learn the **physics** of MRI, and how to optimally choose imaging parameters for experiments.
- To learn the **practical aspects** of conducting fMRI experiments including safety, subject screening, and experimental equipment.
- To learn how to **operate a MRI console** to collect research data.
- To learn how to safely and comfortably **load participants** in/out of an MRI.
- To learn how to thoroughly and professionally conduct an **MRI safety screening**.
- To learn to assess **data quality** during and after scanning, and address common issues.
- To learn how to **operate peripheral equipment** used in MRI research and do basic troubleshooting.
- To learn how to maintain a **safe MR research** environment.

- To learn how to handle **emergency situations** and unexpected events during MRI scanning.

Evaluation & Grading
Grades will be based on: 30% quizzes, 30% practical exercises, 20% participation, and 20% final practical exam.

Quizzes: Short quizzes will be given throughout the quarter during class or as homework to check understanding of concepts and encourage staying on top of the material. The quizzes will likely be multiple choice or short answer format.

Practical Exercises: There will be practical exercises involving all aspects of MRI scanning. These exercises will be conducted in class every week.

Participation: Students are expected to attend every class and be engaged. Successful completion of the course requires students to be hands on in their learning.

Final Practical Exam: At the end of the course, students will use the knowledge they have gained to lead an MRI data collection session from start to finish without assistance.

Attendance
Attendance is critical. Almost every class there will be a quiz or practical exercise. If there are extenuating circumstances that prevent you from attending a class, you must notify me (Dr. Pyles) *before* class by email. In the case of a valid absence, arrangements will be made to make up what you missed.

Schedule (Tentative!)
The course schedule and topics are subject to change at any time throughout the course based on student progress and topic interest! Changes will be posted to Blackboard and the public schedule website at least 24 hours before class (and usually 3-5 days or even earlier).

Week/Class	Date	Topic
1/1		*MRI Physics & Systems*
2/2		*MRI Safety*
3/3		*MRI Safety Screening & CHN Procedures*
4/4		*Magnet Room Procedures*
5/5		*Magnet Room Operations: Loading Participants, coils, etc.*
6/6		*MRI Console Operations*
7/7		*MRI Console Operations II*
8/8		*Peripheral Equipment & Scanning Practicals*
9/9		*Data Quality & Incidental Findings*
20/10		*Practical Exam Practice*