NOTE to prospective students: This syllabus is intended to provide students who are considering taking this course an idea of what they will be learning. A more detailed syllabus will be available later for enrolled students and there may be some changes.

BRAIN & COGNITIVE SCIENCES

Neuroimage Processing (339.632)
3 Credits
Instructor: Moo K. Chung
Instructor contact information: e-mail: mkchung@wisc.edu

Course Description:
Basics on neuroimage processing will be covered. The target audience is the 1st year PhD and masters degree students and researchers although mathematically and computationally sophisticated senior undergraduate students should be able to follow the course. The focus of the course is not on how to use available neuroimaging packages such as SPM/AFNI/FSL but on the basic understanding of mathematical and statistical principles on various image-processing algorithms. However, students are possibly required to do homework using existing neuroimaging software packages. MATLAB will be used as a language of instruction although students can do homework and projects in any computer languages of their choice. The following topics will be covered: registration, segmentation, intensity normalization, image filtering and smoothing, shape and geometry modeling, and basics on neuroimage analysis.

Reading materials:
No textbook is required. However, many topics in Computational statistics handbook with MATLAB by A.R. Martinez, CRC press, 2001 will be covered in connection with neuroimage processing.

Grading criteria:
The course evaluation will be based on attendance and class participation (20%), assignments (80%). Assignments consist of take home exam (30%) and research project (50%).

Schedule:
The weekly teaching plan is as follows. Week 1-2: Introduction to MATLAB and neuroimaging software, Week 3: Intensity normalization, Week 4-6: Image segmentation, Week 7-9: image registration and deformable models, Week 10-11: Image filtering/smoothing, Week 12-13: Case studies and image analysis, Week 14: Student oral presentation & discussion.

Comments:
Few speakers within SNU or other universities will give guest lectures to provide biological/medical motivation for the course.