

HDFS 597E
fMRI Data Analysis
Spring 2010

Instructor: Dr. Peter Molenaar.

Office: Henderson 113 (next to the Living Center)

Office Hours: By appointment (email: pxm21@psu.edu)

Lectures: Thursday 9:00-12:00 am, Henderson S221

Textbook:

Lazar, N.A. (2008). The statistical analysis of functional MRI data. New York: Springer.
Selection of articles.

Recommended Reading:

Sarty, G.E. (2007). Computing brain activity maps from fMRI time-series images.
Cambridge: Cambridge University Press.

Friston, K.J., Ashburner, J.T., Kiebel, S.J., Nichols, T.E., & Penny, W.D. (2008).
Statistical parametric mapping: The analysis of functional brain images. Amsterdam:
Academic Press.

Mitra, P.P., & Bokil, H. (2008). Observed brain dynamics. Oxford: Oxford University
Press.

Purpose of the Course: To build up a thorough understanding of statistical models
used in the analysis of multivariate fMRI, EEG and MEG time series.

Course Outline: Part I fMRI time series analysis and connectivity mapping: a) Physical
principles of MRI; b) General linear model; Introduction Matlab + SPM; c) Mixed models;
d) Structural equation models; e) Vector autoregression; f) Dynamic causal model; g)
State space models. Part II EEG/MEG time series analysis and coherency mapping: h)
Spectrum analysis; i) Multitaper estimates; j) EEG/MEG coherency mapping; k) Neural
source models.

Exam: Two scientific papers, written at the end of each Part, in which a given selection
of models is compared and integrated. For instance: Try to rewrite structural equation
models of fMRI connectivity maps as special cases of the dynamic causal model (Part
1); Compare spectrum estimates based on multitapers and vector autoregressions (Part
II).

HDFS Policy on Student Responsibilities and Classroom Conduct

1. Students are responsible for attending all classes, taking notes, and obtaining
other materials provided by the instructor, taking tests, and completing
assignments as scheduled by the instructor.
 - a. Requests for taking exams or submitting assignments after the due dates
require documentation of events such as illness, family emergency or a
university sanctioned activity.
 - b. Conflicts with dates on which examinations or assignments are scheduled
must be discussed with the instructor or TA prior to the date of the exam
or assignment.

2. Students are responsible for keeping track of changes in the course syllabus made by the instructor throughout the semester.
3. Students are responsible for monitoring their grades.
4. Students must contact the instructor as soon as possible if they anticipate missing multiple classes due to events such as chronic illnesses, travel related to team sports, or other university activities. The instructor will determine the minimal attendance and participation required in order to meet course responsibilities.
5. If extra credit assignments are offered, they must be offered to all students and should not be used to boost the grade of an individual student.
6. Behaviors that disrupt other students' learning are not acceptable (e.g., arriving consistently late for class; cell phone use, reading non-course related materials, or social conversation during class), and will be addressed by the instructor.

University Statement of Academic Integrity (Policy 49-20)

Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Violations of Academic Integrity Policy

Violations of the University's Academic Integrity Policy include the following:

Cheating: using crib sheets of any kind, preprogrammed calculators or cell phones, use of notes during a closed book exam

Copying on tests: looking at other students' exams, copying with a plan with another student, passing notes during exams; exchanging exams with another student

Plagiarism: fabricating information or citations; copying from the Internet or submitting the work of others from journals, articles and papers, or books; submitting other students' papers as one's own. Any material, regardless of length, that is the work of somebody else and who is not given explicit credit by citation, submitted as one's own, is plagiarized material.

Tampering with work: changing one's own or another student's work; tampering with work either as a prank or to sabotage another's work

Acts of aiding and abetting: Facilitating academically dishonest work by others; unauthorized collaboration on work; permitting another to copy from one's exam; writing a paper for another; inappropriately collaborating on home assignments or exams without permission or when prohibited

Unauthorized possession: Buying or stealing of exams or other materials; failing to return exams on file or reviewed in class; selling exams; photocopying exams; any possession of an exam without the instructor's permission

Submitting previous work: Submitting a paper, case study, lab report, or any assignment that had been submitted for credit in a prior class without the knowledge and permission of the instructor

Ghosting or misrepresenting: Taking a quiz or exam or performing a class assignment in place of another student; having another student do the same in one's place; signing in as present in class for another student or having another student do the same in one's place

Altering exams: Changing incorrect answers and seeking favorable grade changes when instructor returns graded exams for in-class review and then collects them; asserting that the instructor make a mistake in grade. Other forms include changing the letter and/or numerical grade on a test.

Computer theft: Electronic theft of computer programs or other software, data, images, art, or text belonging to another.

If a student is considered as having violated the academic integrity policy, the instructor will inform the student and will meet with the student to discuss the allegation. The Undergraduate Professor-in-Charge is available to attend this meeting at the request of the instructor. At the end of the meeting, the instructor decides whether or not a violation has occurred. In the event of an instructor deciding that a violation has occurred, an Academic Integrity Form will be completed and signed by the instructor. The student can acknowledge the violation or contest it; in either case, the student also signs the Academic Integrity Form. A copy of the document will be given to the Professor-in-Charge in the Department, the College, and the University's Office of Judicial Affairs. If the student contests the sanction, further hearings will be held with the student to resolve the matter.

If an instructor recommends that a student be given a failing grade in a course, the student cannot drop the course. The instructor informs the Registrar's Office that a failing grade has been recommended for the student. If the student does drop the course before a final decision is made about sanctions, the failing grade will be reinstated by the Registrar's Office.

University policy allows considerable flexibility to instructors in the determination of sanctions for violations of academic dishonesty. There are two types of sanctions an instructor can recommend—academic and disciplinary. Academic sanctions range from a warning or reduced grade on a single assignment to the student's removal from his/her academic program following guidelines from the College's Academic Integrity Committee. Disciplinary sanctions, although recommended by the instructor or the College, are assigned only at the University level, by the Office of Judicial Affairs. Disciplinary sanctions can range from disciplinary warning to permanent expulsion. The student may also be assigned the XF grade, which is reserved for the most serious breaches of academic integrity.

There are different sanctioning guidelines for minor, moderate, or major offenses of academic integrity. Detailed information about procedures and sanctions can be found under Academic Integrity at the website of the Office of Judicial Affairs:

<http://www.sa.psu.edu/ja/conduct.shtml>