Statistics 625: Applied Bayesian Analysis - Winter Quarter 2010

Instructor
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Course Description
This course aims to provide a practical introduction to Bayesian data analysis. Students will be exposed to a variety of Bayesian models including the Bayesian linear model for normal and non-normal data. Bayesian hierarchical modeling will be discussed as a strategy for modeling complex processes and as a means of assimilating a variety of sources of data, and students will be required to complete a project in which they fit a hierarchical model to data. Simulation-based methods for model-fitting will be introduced, and students will learn to use the WinBUGS/OpenBUGS software in addition to programming basic MCMC algorithms in R.

Prerequisites
Statistical Theory (Stat 520 and 521, Stat 610 and 623, or Stat 620 and 621) and Applied Regression Analysis (Stat 645), or permission of the instructor

Website
http://www.stat.osu.edu/~calder/stat625-wi10/
The class schedule, important announcements, lecture notes, homework problems and solutions, and other information about the course will be posted on Carmen (http://www.carmen.osu.edu).

Lectures
TTh 10-11:48am in 2003 Evans Lab
Lecture notes will be posted on Carmen before class. Please read the sections of the textbook that will be covered, and print out a copy of the lecture notes before each class. There may be parts of the notes that you should fill in during lecture, and you may need to take separate notes on examples that are not in the lecture notes. Unless instructed otherwise, you are responsible for all of the material in the sections of the book that are covered in lecture even if some of the material in the book section is not covered in class. If you are unsure if you are responsible for a particular topic, be sure to ask the instructor.

Required Textbook

Midterm Exam
There will be an in-class midterm (tentatively) given on Thursday, Feb. 11th. Re-grade requests on the midterm exam must be submitted to the instructor in writing within one week of the day the midterms are handed back. Please bring a calculator to the midterm exam.
Project
Each student is required to independently complete a project involving fitting a hierarchical Bayesian model to real data. A detailed description of the requirements for the project proposal (due on Tuesday, Feb. 23rd) and report (due on Tuesday, March 16th by 5pm) will be distributed in class and on Carmen.

Homework Assignments
There will be four homework assignments for the course. You are encouraged to work together on the problems, but each student must hand in his or her own work. DO NOT COPY any part of another student’s homework including computer output.

Solutions to the homework problems will be posted on Carmen. Late homework assignments will be accepted until the solutions have been posted on the website. Once the solutions have been posted, late homework will not be accepted. If you are unable to come to class the day a homework assignment is due, please contact the instructor. Re-grade requests on the homework problems must be submitted in writing to the course grader within one week of the day the solutions are posted.

Grading
The following is a breakdown of your final course grade:

        Midterm 35%    Project 40%    Homework 25%

Grades on the midterm exam may be curved if necessary.

Computing
We will be using the R statistical computing package and the Bayesian Inference Using Gibbs Sampling (WinBUGS/OpenBUGS) software, which are both freely available. No prior knowledge of these computing packages is required, although experience with R (or S-plus) will be helpful. Both R and WinBUGS/OpenBUGS are available in the Department of Statistics computing laboratory, although this facility is only available to Statistics students. Links to websites where these tools can be downloaded and reference manuals are available on Carmen. Most homework assignments will require some computing. Please cut and paste your computer output and graphs into your homework solutions.

Special Accommodations
If you need any accommodations based on the impact of a documented disability contact the instructor privately to discuss your specific needs. You should also contact the Office of Disability Services to coordinate special accommodations.

Academic Misconduct
Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with university policy.