

Statistics 694: Applied Bayesian Analysis – – Winter 2006

SYLLABUS

Instructor

Dr. Catherine Calder

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Grader

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Office Hours: MF 10:30-11:30am

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.ohio-state.edu/~calder/stat694/>

Important announcements, lecture notes, homework problems and solutions, computing references, and other information about the class are posted on the course website.

Lectures TTh 10:00-11:18am in 0141 Biological Sciences (BI)

Lecture notes will be posted on the course website 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 *Bayesian Data Analysis, Second Edition* (2004)

By Andrew Gelman, John B. Carlin, Hal S. Stern, and Donald B. Rubin

Midterm Exam

There will be an in-class midterm given on Thursday, Feb. 9th. Re-grade requests on the midterm exam must be submitted to the grader 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. 21st) and report (due on Tuesday, March 14th by 5pm) will be distributed in class and on the course website.

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 the course website. 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	30 %
Final Project	30 %
Homework	40 %

Grades on the midterm exam might 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 the course website. 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.