Course Description: Introduction to Bayesian Data Analysis

The course will introduce data analysis from the Bayesian perspective to undergraduate students. We will cover important concepts in Bayesian probability modeling as well as estimation using both optimization and simulation-based strategies. Key topics covered in the course include hierarchical models, mixture models, hidden Markov models and Markov Chain Monte Carlo.

Prerequisites:
1. A course in probability (Statistics 430 or equivalent)
2. A course in statistical inference (Stat 102, Stat 112, Stat 431 or equivalent)
3. Experience with the statistical software R (at the level of Stat 405 or Stat 470)

Professor:
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Lectures: TTh 3:00-4:30pm JMHH 360

Required Textbook:
Bayesian Data Analysis (3nd Edition) by Gelman, et.al.

Required Software:
The R statistical package is needed and can be downloaded at `www.r-project.org`

Midterm 1 Exam: Thursday, February 28th (in class)

Midterm 2 Exam: Tuesday, April 30th (in class)

Course Topics

1. Introduction to Bayesian Inference (Ch.1)
2. Simple Parametric Models (Ch. 2, 3)
3. Regression Models from the Bayesian Perspective (Ch. 14,15)
4. Hierarchical and Mixture Models (Ch. 5)
5. Optimization Algorithms for Model Estimation (Ch. 13)
6. Monte Carlo Simulation Algorithms for Model Estimation (Ch. 10,12,13)
7. Model Checking (Ch. 6,7)
8. Nonparametric and Semiparametric Bayesian models (Ch. 23)
9. Hidden Markov Models
10. Bayesian approaches to tree models, BART

Evaluation:
Your course grade will be calculated as:
    40% homeworks
    30% for the midterm 1 examination
    30% for the midterm 2 examination

Notes about Grading:

- ***No late homeworks will be accepted, for any reason whatsoever.***

- No make-up midterms will be given, so make sure that you do not have other commitments during the midterm times