



## Statistics 542 Spring 2010

### **Course Description: Bayesian Methods and Computation**

The goal of this course is to develop sophisticated tools for probability modeling and data analysis from the Bayesian perspective. Key topics covered in the course include hierarchical models, optimization algorithms and Monte Carlo simulation techniques.

**Prerequisites:** Probability (Statistics 430, 510 or equivalent) or permission of instructor

### **Professor:**

Dr. Shane Jensen  
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JMHH 463  
215-573-2211

**Lectures:** TTh 10:30-12:00 JMHH F94

### **Required Textbook:**

Bayesian Data Analysis (2<sup>nd</sup> Edition) by A. Gelman, J. Carlin, H. Stern, and D. Rubin.

### **Required Software:**

The R statistical package is needed and can be downloaded at [www.r-project.org](http://www.r-project.org)

### **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. Frequentist properties of Bayesian methods (Ch. 4)
5. Hierarchical and Mixture Models (Ch. 5,18)
6. Optimization Algorithms for Model Estimation (Ch. 12)
7. Monte Carlo Simulation Algorithms for Model Estimation (Ch. 10,11,13)
8. Model Checking (Ch. 6)
10. Nonparametric and Semiparametric Bayesian models
11. Hidden Markov Models

### **Other Course Information**

**Office hour:** Tuesday 5:00-6:00 JMHH 463

**Course Website:** [stat.wharton.upenn.edu/~stjensen/stat542.html](http://stat.wharton.upenn.edu/~stjensen/stat542.html)

**Evaluation:**

Your course grade will be calculated from homeworks. Homework assignments will be assigned every two weeks or so and will be turned in for grading. *No late homework will be accepted, for any reason whatsoever.*

**Important Dates:**

Thursday, January 14

Tuesday, March 9

Thursday, March 11

Tuesday, April 27

First day of class

No Class -- Spring Break

No Class -- Spring Break

Last day of class