Hunter College of The City University of New York

STAT 319 Introduction to Bayesian Inference   3 hrs, 3 cr

TEXTBOOKS: 1. <u>Bayesian Statistics: An Introduction</u> by Peter M. Lee, 3rd edition, Hodder Education (2004)

2. <u>Bayesian Computation with R</u> by Jim Albert, (2007)

Preliminaries
- Probability and Bayes Theorem
- Random variables
- Mean and variables
- Introduction to Bayesian thinking

Single-Parameter Models
- Bayesian estimation of normal mean, when variance is known
- Summary of the posterior distribution using high density regions
- Bayesian estimation of normal variance, when mean is known
- Binomial likelihood and Bayesian estimation of proportions
- Poisson likelihood and Bayesian estimation of rates

Multiparameter Models
- Joint Bayesian estimation of normal mean and variance
- Binomial/Logistic setup: bioassay experiment
- Comparing two proportions

Markov Chain Monte Carlo Methods
- Introduction to Markov chains
- Metropolis-Hasting algorithms
- Gibbs sampling
- Binomial/Logistic setup, revisited using Gibbs
- MCMC output analysis and applications

Additional topics selected from:
- Hidden Markov chain models and the EM algorithm
- Hierarchical models
- Bayesian hypothesis testing
- Bayesian regression analysis

- Further Gibbs sampling applications
- R/BUGS interface