

# Bayesian Statistics/Econometrics, Fall Semester, 2010

## Basic Information:

Professor: Robert McCulloch

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Office Hours: 12:30-1:30pm, tuesdays and thursdays and by appointment.

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## Course Objectives

Our basic objective is to learn the fundamentals of the Bayesian approach to modeling. Modern Bayesian work requires computing skills. Our second basic objective is to learn the statistical computing environment **R**.

**R** is free open source software that runs easily on all three platforms (Window,Mac,Linux). In the last few years **R** has been widely adopted by the statistical community. **R** combines a high level “scripting language” type programming environment a high level of statistical and graphics functionality.

To install **R** just google “The **R** project”.

## Syllabus

The course will have two parts. The first part will closely follow the book “Bayesian Computation with **R**” by Jim Albert. The second part of the course will be more advanced topics. All students are expected to master the first part, the second part is viewed as enrichment.

Topics we will cover from the the Albert book (this is just a list of chapters from the book):

- (1) An Introduction to **R**
- (2) Introduction to Bayesian Thinking
- (3) Single Parameter Models (eg. Normal with known variance)
- (4) Multiparameter Models (eg. Normal with unknown mean and variance)
- (5) Introduction to Bayesian Computation
- (6) Markov Chain Monte Carlo Methods
- (7) Hierarchical Modeling

(8) Model Comparison

(9) Regression Models

Special Topics we might cover are:

Mixtures of Normals

“Bayesian Statistics in Marketing”, Rossi, Allenby, McCulloch, 2005, section 3.9. “Finite Mixture and Markov Switching Models”, Fruhwirth-Schnatter, 2006.

State-Space Models, Stochastic Volatility.

Instrumental Variables

“Bayesian Statistics in Marketing”, Rossi, Allenby, McCulloch, 2005, chapter 7.

## Grades

There will be graded homework and a final project.

## Other books of interest

Markov Chain Monte Carlo: Stochastic Simulation for Bayesian Inference, Second Edition (Chapman & Hall/CRC Texts in Statistical Science) by Dani Gamerman and Hedibert F. Lopes (Hardcover - May 10, 2006)

A First Course in Bayesian Statistical Methods (Springer Texts in Statistics) - Hardcover (June 15, 2009) by Peter D. Hoff

Bayesian Methods for Data Analysis, Third Edition (Chapman & Hall/CRC Texts in Statistical Science) by Bradley P. Carlin and Thomas A. Louis (Hardcover - Jun 30, 2008)