THE UNIVERSITY OF TEXAS AT AUSTIN
MCCOMBS SCHOOL OF BUSINESS

Syllabus for STA380
Bayesian Statistical Models
Fall, 2009

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Books:

Our primary text will be (GL below):
"Markov Chain Monte Carlo, Stochastic Simulation for Bayesian Inference".
Gamerman and Lopes, Chapman and Hall.

We will also use (and the associated R-package)(BM below),
"Bayesian Statistics and Marketing".
Rossi, Allenby, and McCulloch, Wiley.

Other notable books:

Monte Carlo Methods, by Casella and Robert.

Modern Bayesian Econometrics, by John Geweke.

Bayesian Econometric Methods, by Koop, Poirier, and Tobias.

Rough Outline:

1. Bayesian Basics, Conjugate Models, and Regression.
GL: 2.1-2.3, BM: 2.0-2.8

2. Markov Chain Monte Carlo.
GL:4,5,6, BM:3

3. Hierarchical and Graphical Models in Bayesian Analysis.
GL: 2.4, BM: 3.6

4. Model Choice and Analytic Approximations.
GL: 7.1-7.3, BM: 6

5. Variable Selection
"Approaches for Bayesian Variable Selection".

6. Instrumental Variables and some non-parametric Bayes.
"A Semi-parametric Bayesian Approach to the Instrumental Variable Problem"

7. Logit and Probit, Mixtures of Normals.
BM: 4,5

8. Time Series, State-Space Models.
"MCMC Methods for Continuous-Time Financial Econometrics".

We can then do whatever topics we like, eg.
Theory: subjective probability and coherence, the complete class theorem, the likelihood principle
Application: bayesian biostatistics models: spatial,....

Grades:

Weekly (most) homework and a final project (groups allowed).
Final project could be an application, or reproduce resulte in a paper, or whatever.

Computing:

Computing will be an important part of the course. Most homework will be computational. We will use R and C/C++.

Computing is absolutely essential to doing bayesian stuff. There a lot of choices for computational environments and languages and the right choice is not obvious.

R has become dominant in statistics and it is mostly what I use so that is what we will do. You have to know a lower level language and I have decided it might as well be C. Learning C++ is more of a question mark. We'll see how far we get.

R is free open source software, easily installed on all platforms. Just google the R project.

There is a link on the webpage for R documentation but basically you just have to plow through "An Introduction to R".

We also need to learn some "basic" things like make files, calling C from R, and calling fortran from C/C++.

We will discuss compilers for windows. I use linux/gcc.

Books I cannnot live without:

Linux Pocket Guide, O'Reilly

The C Programming Language, 2nd ed, by Kernighan and Ritchie, Prentice.

Accelerated C++, Koenig and Moo, Addison Wesley.

An Introduction of GCC, Brian Gough, Network Theory Limited.

The Complete Reference, GCC, by Arthur Griffith, Osborne.