

GOV 385L
Bayesian Statistics in Political Science
Unique # 38945
Spring 2012

Th 3:30-6:30
Batts 5.102

Professor Stephen Jessee

Office Hours:
W 2-4, Th 2-3
Batts 4.128

Description. This course will cover Bayesian statistics with a focus on social science (especially political science) examples and applications. The class will begin by covering the basics of Bayesian statistics including the differences between Bayesian and standard (frequentist) estimation and inference. The course will also focus on modern estimation techniques, especially MCMC simulation methods and, as time allows, will move on to more specialized topics. The class will also spend a considerable amount of time covering so-called latent traits models both because the Bayesian approach is particularly well suited for these types of models and also because these models are extremely useful in political science for learning about underlying quantities that cannot be directly measured (e.g., ideology, political knowledge, level of democracy, etc.).

After completion of this course, it is expected that students will have the tools to design, estimate and interpret Bayesian statistical models in their own work. With this aim, the course will be mostly applied in nature.

Prerequisites. Students taking this course should have a basic working knowledge of statistical estimation and hypothesis testing as well as linear models and maximum likelihood estimation. Students who are not familiar with these things should talk with the professor before enrolling in this course.

Evaluation. Grades in this course will be based on problem sets (assigned throughout the semester approximately one every two weeks), a midterm examination, a final examination and a paper applying the methods learned during the semester. The final exam will take place during the final exam period assigned by the registrar. Approximate breakdown of the grades will be as follows:

Problem Sets	30%
Midterm Examination	20%
Final Examination	25%
Paper	25%

Students may work in groups on homework assignments unless otherwise stated, but each student should both prepare and turn in his or her own assignment. I trust that students know the difference between working together and copying off of one another. Students must work alone on exams.

Books. The required textbook for the course will be:

Jackman, Simon. 2009. Bayesian Analysis for the Social Sciences. Wiley.

Note: as with all first editions, this book contains a non-trivial number of errors. Students should consult the errata page on the author's website in order to correct these:

<http://jackman.stanford.edu/mcmc/book/errata.pdf>

Other materials including journal articles and working papers will also be assigned as we go.

Having more than one description of a concept can often be very helpful, so students may wish to have other references to consult. Other books that may be helpful (listed with brief descriptions) are:

Gill, Jeff. 2008. Bayesian Methods: A Social and Behavioral Sciences Approach (2nd Edition). Chapman and Hall.

A good comprehensive social science Bayes book approximately at the level of Jackman. I used this book the last time I taught the course and liked it very much.

Lynch, Scott M. 2007. Introduction to Applied Bayesian Statistics and Estimation for Social Scientists. Springer.

A good introductory text with nice descriptions of motivations and approaches. Relatively short, so not a great bookshelf reference for Bayesian statistics, but may be useful for those wanting another, more basic and somewhat conversational, source.

Gelman, Carlin, Stern and Rubin. 2004. Bayesian Data Analysis. Chapman and Hall.

Somewhat advanced and written with a statistics (as opposed to social science) audience in mind. Very comprehensive (almost 700 pages!) and a good reference for most topics. This is a standard text for Bayesian statistics across many disciplines.

Lancaster, Tony. 2004. An Introduction to Modern Bayesian Econometrics. Blackwell Publishing.

Written from an econometrics perspective. Nice discussion early on of the Bayesian approach. May focus more on econometric concerns than other books.

Required Computer Programs. This course will rely heavily on the statistical program **R**. It can be downloaded for free at <http://www.r-project.org>. Useful references for **R** are “An Introduction to R,” which can be downloaded at <http://cran.r-project.org/doc/manuals/R-intro.pdf> and the book “An R and S-Plus Companion to Applied Regression” by John Fox. Students may also wish to run R from a more fully featured text editor such as Emacs. Instructions for doing this (on Microsoft Windows) can be found on Fox’s website at <http://socserv.mcmaster.ca/jfox>.

During the second half of the course we will also be using the program WinBUGS (**B**ayesian inference **U**sing **G**ibbs **S**ampling). This program allows for the estimation of a broad class of models and is very flexible. The main disadvantage is that it is designed to run only on the Windows operating system. Other variants, such as OpenBUGS may be able to run on Linux or other operating systems, but students will most likely have to find a Windows machine (or virtual machine) to use for portions of this course. I will try to get WinBUGS installed on the machines in the Government Department computer lab for students to use. WinBUGS can be downloaded (also for free) at <http://www.mrc-bsu.cam.ac.uk/bugs/>. The program JAGS provides similar functionality to WinBUGS, but can be installed on Macs and other computers. This program may be used by students instead of BUGS if desired, but my primary expertise is with BUGS and I may not always be able to help with JAGS (although I’ve been intending to learn it for a while...).

Expectations. Students will be expected to keep up with the course material at all times. As with all methods courses, the material can be challenging and if you fall behind, it can be difficult to catch up and to understand new material.

My primary goal in this course is to present this material to you in as helpful and useful a manner as possible. To that end, please do not hesitate to come to me with any comments or concerns that you have during the course. In particular, you are encouraged to speak up if you have trouble understanding any material. If you are having difficulty, it is very likely that others are as well.

Laptop Policy. Students should not bring laptops, cell phones or other electronic devices to class unless instructed to. I have found that these things almost uniformly detract from the class environment in graduate seminars, so they will not be permitted unless they have a specific purpose, which will be rarely.

Students with disabilities: Students with disabilities may request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 471-6259, <http://www.utexas.edu/diversity/ddce/ssd/>