Doing Bayesian Data Analysis: An Introduction.
Inter-University Consortium for Political and Social Research (ICPSR), Ann Arbor, MI.
Monday June 20 – Friday June 24, 9:00am-5:00pm

Instructor: John Kruschke, Indiana University.

Brief description (from the ICPSR web page): Bayesian data analysis is rapidly supplanting traditional statistical methods because it provides richer inferences from empirical observations, without having to resort to ill-defined probability values in hypothesis tests. This workshop introduces participants to modern Bayesian methods. We will begin with the basic ideas of probability and Bayes’ rule. After that, we move on to cover probability distributions, grid approximation, Markov chain Monte Carlo methods, and Bayesian approaches to some specific statistical models (e.g., the multiple linear regression model, ANOVA, contingency table analysis, hierarchical models). Along the way, we will consider additional topics, including null hypothesis significance testing, Bayesian model comparison, Bayesian assessment of null values, and statistical power. Upon completion of this workshop, participants should be able to incorporate Bayesian tools into their own research projects and data analyses.

Prerequisites (from the ICPSR web page): It would be helpful if participants have had previous exposure to the basic concepts of multiple regression and ANOVA. And, they should be comfortable with summation and integral notation. No matrix algebra will be used in the workshop. Data analysis for this class will be carried out in the R statistical software environment, but no prior experience with R is necessary.

Agenda:

Day 1:
- Probabilities and Bayes’ rule.
- Grid approximation.
- [The beta distribution.]
- The R programming language.

Day 2:
- Markov chain Monte Carlo methods.
- The BUGS/BRugs software package.
- Estimating the parameters of a normal distribution.

Day 3:
- Null hypothesis significance testing.
- Bayesian model comparison.
- Bayesian assessment of null values.
- Statistical power.

Day 4:
- The generalized linear model.
- Multiple regression: linear, logistic, ordinal, and non-linear.

Day 5:
- Analysis of variance.
- Contingency table analysis.

Complete computer programs available from http://www.indiana.edu/~kruschke/DoingBayesianDataAnalysis/