Advanced Methodology
Political Science 303
Fall 2008

Class Time:	Tuesday & Thursday 10:55-12:10
Classroom:	177 Schaeffer (Tuesdays); 21 Schaeffer (Thursdays)
Instructor:	Fred Boehmke
Office:	308 Schaeffer
Office Hours:	Tuesday 4-5pm & Wednesday 3-4pm, or by appointment.
Email:	frederick-boehmke@uiowa.edu
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Course description

This class will introduce you to a variety of statistical techniques for limited dependent variables relevant to political science research. The objective is for you to become familiar enough with them to understand how, when and why to use them. Emphasis will therefore be on empirical applications and a large portion of class time (probably about 40% of classes) will be devoted to hands-on use and interpretation of these methods in the computer lab. The class will require you to know or learn how to use Stata since almost all of our applications can be done using it and many of them essentially require it (unless you want to write your own code…). I will also assume familiarity with maximum likelihood, linear algebra, calculus and probability theory, but we will likely review these topics a bit as necessary.

The three main topics this semester are discrete choice analysis, models for event count data and duration analysis. Additional and related topics will be covered as necessary. The main tools through which you will familiarize yourself with these methods are Maximum Likelihood Estimation and Monte Carlo analysis, which will be presented in the first and second weeks. Many of your homework assignments and an in-class presentation will involve Monte Carlo analysis.

Grades will be based on five parts: homework assignments (40%), a midterm exam (20%), a final exam (20%), and a final project involving an in-class presentation (15%) and the circulation of replication materials (5%) at the end of the semester.

Course Requirements

1. Homework.

   The best way to learn the material is to use the estimators. I will assign homework on a weekly to bi-weekly basis. Many of the assignments will specify a model and ask you to run a Monte Carlo analysis that involves generating data and then estimating the parameters using a few different assumptions (both correct and incorrect). When you turn in the homework,

I want you to upload an electronic copy of your Stata program file and an appropriate graphical or tabular representation of the results to ICON. Late homework will lose ten percent of the total value per week unless prior arrangements are made.

2. Exams

   There will be a midterm and a final examination. These will be timed take-home exams. The emphasis will be explanation through words not equations, though some of the latter will be required as well.

3. Final Project

   a. In-class Presentation.

      During the last week of the semester, class members will present the results of their research project to the class in conference format (12-15 minute presentations). Guidelines for presentations are included on the Department's *Resources for Graduate Students* web page; additional materials may also be circulated. The focus of the presentation should involve either 1) the application of a suitable, advanced method to a substantive research question; 2) the theoretical development of a new method; or 3) a detailed investigation of existing methods using Monte Carlo analysis, with a critique of current studies.

      Presentations must also meet the following criteria (adapted to the three options as appropriate):

      i. No fewer than 5 and no more than 15 slides.
      ii. One slide must explain why the primary method allows an improvement over previous studies or how the primary method permits appropriate testing of novel hypotheses.
      iii. One slide must present a graphical (or tabular, but only if necessary) interpretation of the main result.
      iv. One slide must indicate the primary hypothesis being tested.
      v. One slide must clearly indicate the data and/or methods employed.

      You must upload a copy of your presentation to ICON before your scheduled presentation day for grading purposes.

   b. Replication Materials.

      You will also submit a complete set of replication materials for the analysis in your presentation through ICON along with your slides. These files must allow anyone to replicate your results without consulting you and should run on any computer with Stata installed. You should use comments liberally to help users follow your code. At a minimum, your replication materials should include:

      i. The Stata batch file that you used to construct your data set so that others can see your coding decisions.
      ii. Your final data set (you do not need to supply the original, raw data set(s)).

iii. A Stata batch file that runs all the analysis in your poster, including the creation of the quantities of interest in the interpretation slide.
iv. Your lab book that you prepare over the course of the semester documenting important data, coding, and statistical decisions that you make.

General Topics to be Covered

I will pick out a few papers from the current topic each week and expect you to read them, but the ones I do not assign will also be useful if you are interested in that area or want to see some empirical applications.

1. Discrete Choice Analysis.
2. Count Models.
3. Duration Analysis.
4. Monte Carlo Analysis.
5. Maximum Likelihood Estimation.

Books

There are is one required book books assigned for the class.

> Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables*. United States of America: Sage Publications.

In addition, the following books will be useful as well and are recommended.

> King, Gary. 1989. *Unifying Political Methodology: The Likelihood Theory of Statistical Inference.* Ann Arbor: The University of Michigan Press.
>
> Box-Steffensmeier, Janet M. and Bradford S. Jones. 2004. *Event History Modeling: A Guide for Social Scientists.* Cambridge University Press.

The following books are also good to have around for reference and will be useful for topics covered in the class.

> Cameron, A. Colin and Pravin K. Trivedi. 1998. *Regression Analysis of Count Data*. Oxford: Oxford University Press.
>
> Franzese, Robert J. and Cindy Kam. 2007. *Modeling and Interpreting Interactive Hypotheses in Regression Analysis*. Ann Arbor: University of Michigan Press.
>
> Gould, William and William Sribney. 2005. *Maximum Likelihood Estimation With Stata, 3rd Edition*. College Station, TX: Stata Press.

Greene, William. 1999. *Econometric Analysis*. Upper Saddle River, NJ: Prentice-Hall, fourth edition.

Long, J. Scott and Jeremy Freese. 2001. *Regression Models for Categorical Dependent Variables Using Stata*. College Station, Texas: Stata Press.

Maddala, G.S. 1983. *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge: Cambridge University Press.

Mitchell, Michael N. 2008. *A Visual Guide to Stata Graphics, 2nd Edition.* College Station, TX: Stata Press.

Mooney, Christopher. 1997. *Monte Carlo Simulation.* Thousand Oaks, CA: Sage Publications.

Week 1: Introduction and Review of Maximum Likelihood Estimation

Long, Chapter 1.

King, Gary. 1991. "On Political Methodology." *Political Analysis* 2: 1-29.

Beck, Nathaniel. 1999. "Political Methodology - A Welcoming Discipline." Political Methodology Electronic Paper Archive.

Nagler, Jonathan. 1995. "Coding Style and Good Computing Practices" (in Verification/Replication). *PS: Political Science and Politics* 28 (3): 488-492.

King, Gary. 1986. "How Not To Lie With Statistics: Avoiding Common Mistakes in Quantitative Political Science." *American Journal of Political Science* 30: 666-687.

Week 2: Logit and Probit

Long, Chapters 3-4.

Week 3: Estimating Quantities of Interest

King, Gary; Tomz, Michael and Jason Wittenberg. 2000. "Making the Most of Statistical Analyses: Improving Interpretation and Presentation." *American Journal of Political Science* 44:347-361.

Watch the presentation at http://psweb.sbs.ohio-state.edu/methods_videos/index.html

CLARIFY documentation: http://gking.harvard.edu/clarify/clarify.pdf.

Week 4: Monte Carlo Analysis

Christopher Z. Mooney; George A. Krause. 1997. "Of Silicon and Political Science - Computationally Intensive Techniques of Statistical Estimation and Inference." *British Journal of Political Science* 27 (1): 83-110.

Mooney, Christopher. 1997. *Monte Carlo Simulation.* Thousand Oaks, CA: Sage Publications.

Week 5: Ordered Logit and Probit

Long, Chapter 5.

Winship and Mare. 1984. "Regression Models with Ordinal Variables." *American Sociological Review* 49:512-525.

McKelvey, William, and William Zavoina. 1975. "A Statistical Model for the Analysis of Ordinal Level Variables." *Journal of Mathematical Sociology* 4:103-120.

Week 6: Multinomial Logit and Probit

Long, Chapter 6.

Alvarez, R. Michael and Jonathan Nagler. 1998. "When Politics and Models Collide: Estimating Models of Multiparty Elections." *American Journal of Political Science* 42: 55-96.

Dow, Jay K. and James W. Endersby. 2004. "Multinomial probit and multinomial logit: a comparison of choice models for voting research." *Electoral Studies* 23: 107–122.

Week 7: Heteroskedastic Probit

Alvarez, R. Michael and John Brehm. 1995. "American Ambivalence Towards Abortion Policy: A Heteroskedastic Probit Method for Assessing Conflicting Values." *American Journal of Political Science* 39:1055-1082.

Keele, Luke J. and David K. Park. 2006. "Ambivalent about Ambivalence: A Reexamination of Heteroskedastic Probit Models." Working paper.

Week 8: Multivariate Probit

Greene, William. 1993. *Econometric Analysis*. Upper Saddle River, NJ: Prentice-Hall, *2nd Ed*. Chapter 21, Section 6 "Bivariate and Multivariate Probit".

Week 9: Censoring, Truncation, and Sample Selection

Long, Chapter 7.

Week 10: Interpreting Interaction Effects

Franzese, Robert J. and Cindy Kam. 2007. *Modeling and Interpreting Interactive Hypotheses in Regression Analysis*. Ann Arbor: University of Michigan Press.

Brambor Thomas; William Clark; Matt Golder. 2006. "Understanding Interaction Models: Improving Empirical Analyses." *Political Analysis* 14: 63-82.

Week 11: Discrete-Time Duration Analysis and Cross-Sectional Time-Series Data

Long, Chapter 9, Section 4.

Box-Steffensmeier, Janet M. and Bradford D. Jones. 2004. *Event History Modeling: A Guide for Social Scientists.* Cambridge University Press. Ch 1, 5-7.

Box-Steffensmeier, Janet M. and Bradford D. Jones. 1997. "Time Is of the Essence: Event History Models in Political Science." *American Journal of Political Science* 41: 1414-1461.

Allison, Paul D. 1984. *Event History Analysis: Regression for Longitudinal Event Data.* Sage University Paper Series on Quantitative Applications in the Social Sciences, series no. 07-046. Beverly Hills and London: Sage Publications

King, Gary and Langche Zeng. 2001. "Logistic Regression in Rare Events Data." *Political Analysis* 9:137-163.

Beck, Nathaniel, Jonathan N. Katz, and Richard Tucker. 1998. "Taking Time Seriously: Time-Series-Cross-Section Analysis With a Binary Dependent Variable." *American Journal of Political Science* 42: 1260-1288.

Week 13: Continuous-Time Duration Estimators and the Cox Estimator

Box-Steffensmeier, Janet M. and Bradford D. Jones. 2004. *Event History Modeling: A Guide for Social Scientists.* Cambridge University Press. Ch 2-4, 10.

Box-Steffensmeier, Janet M. and Christopher Zorn. 2002. "Duration Models for Repeated Events." *Journal of Politics* 64 (4): 1069-1094.

Week 14: The Poisson Regression Model

Long, Chapter 8, Sections 1-2.

King, Gary. 1988. “Statistical Models for Political Science Event Counts: Bias in Conventional Procedures and Evidence for the Exponential Poisson Regression Model.” *American Journal of Political Science* 32: 838-863.

Week 14: Thanksgiving Break

Week 15: Negative Binomial Count Estimator

Long, Chapter 8, Section 3.

King, Gary. 1989a. “Variance Specification in Event Count Models: From Restrictive Assumptions to a Generalized Estimator.” *American Journal of Political Science* 33: 762-784.

Week 16: Student Presentations

The Political Science Department, The University of Iowa, Professor Tom W. Rice, Chair, 341 Schaeffer Hall, 335-2358

STUDENTS WITH DISABILITIES Website: http://www.uiowa.edu/~sds/ Instructors will make reasonable accommodations for students with physical, mental or learning disabilities. Students with disabilities which may require some modification of seating, testing, or other class requirements are to inform the instructor (after class or during the instructor's office hours) so that appropriate arrangements may be made. It is the student's responsibility to contact Student Disability Services, 133 Burge Hall (335-1462) and obtain a Student Academic Accommodation Request form (SAAR). The form will specify what course accommodations are judged reasonable for that student. An instructor who cannot provide the accommodations specified, or has concerns about the accommodations, must contact the Student Disability Services counselor who signed the request form within 48 hours of receiving the form from the student.

DEPARTMENTAL/COLLEGIATE COMPLAINT PROCEDURES Website: http://www.clas.uiowa.edu/students/academic_handbook/ix.shtml#5 (See "Student Complaints") A student who has a complaint against any member of the college's teaching staff is responsible for following the procedures described in the Student Academic Handbook, which is available on the web site of the College of Liberal Arts and Sciences: http://www.clas.uiowa.edu/students/academic.handbook/ix.shtml/ The student should attempt to resolve the issue with the faculty member or teaching assistant involved. Lacking a satisfactory outcome, the student can turn to the department chair, whose name is listed above along with contact information. (If the complaint concerns a teaching assistant, the student should contact the supervising faculty member first.) If a satisfactory outcome still is not obtained, the student can turn to the College of Liberal Arts and Sciences. Complaints may concern inappropriate faculty conduct (including inappropriate course materials), incompetence in oral communication, inequities in assignments, scheduling of examinations at other than authorized and published times, failure to provide disability accommodations, or grading grievances. In complaints involving the assignment of grades, it is college policy that grades cannot be changed without the permission of the department concerned.

PLAGIARISM AND CHEATING See Academic Fraud at http://www.clas.uiowa.edu/students/academic_handbook/ix.shtml for the complete policy. You are expected to be honest and honorable in your fulfillment of assignments and in test-taking situations. Plagiarism and cheating are serious forms of academic misconduct. Examples of them are given in the Student Academic Handbook: www.clas.uiowa.edu/students/academic_handbook//ix.shtml/ The Department of Political Science works with individual instructors to detect plagiarism and cheating and to ensure that appropriately serious punishments are applied. An instructor who suspects a student of plagiarism or cheating must inform the student (preferably in writing) as soon as possible after the incident has been observed or discovered. Instructors who detect cheating or plagiarism may decide, in consultation with the departmental executive officer, to reduce the student's grade on the assignment or the course, even to assign an F. The instructor writes an account of the chronology of the plagiarism or cheating incident for the departmental executive officer who sends an endorsement of the written report of the case to Associate Dean of the College of Liberal Arts and Sciences. A copy of the report will be sent to the student.

SEXUAL HARASSMENT You should familiarize yourself with the following web site link from the College of Liberal Arts: http://www.sexualharassment.uiowa.edu/policy.php

YOUR RESPONSIBILTIES Your responsibilities to this class-and to your education as a whole-include attendance and participation. This syllabus details specific expectations the instructor may have about attendance and participation. You have a responsibility to help create a classroom environment where all may learn. At the most basic level, this means you will respect the other members of the class and the instructor and treat them with the courtesy you hope to receive in return.

ENROLLED COURSES OUTSIDE YOUR COLLEGE Taking a course outside the College of Liberal Arts and Sciences means that class policies on matters such as requirements, grading, and sanctions for academic dishonesty are governed by the College where the course resides. Students wishing to add or drop this course after the official deadline must receive the approval of the Dean of that College. Details of the University policy of cross enrollments may be found at: http://www.uiowa.edu/~provost/deos/crossenroll.doc/ Deadlines: See Registrar's Office web site: http://www.registrar.uiowa.edu/

PLUS-MINUS GRADING All the department's instructors can append plus or minus grades to the letter grades they assign for the course. If the instructor does not specifically indicate in the syllabus that he or she will not assign plusses or minuses, students should assume that this form of grading will be used.

HOMEWORK EXPECTATION For each semester hour of credit that a Political Science course carries, students should expect to spend approximately two hours per week outside of class preparing for class sessions. That is, in a three-credit-hour course, instructors design course assignments on the assumption that students will spend six hours per week in out-of-class preparation.

REACTING SAFELY TO SEVERE WEATHER The University of Iowa Operations Manual section 16.14 outlines appropriate responses to a tornado (1) or to a similar crisis. If a tornado or other severe weather is indicated by the UI outdoor warning system, members of the class should seek shelter in rooms and corridors in the innermost part of a building at the lowest level, staying clear of windows, or large free-standing expanses such as auditoriums and cafeterias. The class will resume, if possible, after the UI outdoor warning system announces that the severe weather threat has ended. Web site: http://www.clas.uiowa..edu/faculty/teaching/new_policytemplate.shtml.

Please visit the Political Science Department's web site: http://www.polisci.uiowa.edu/. It is frequently updated with new events and procedures in our department, changes in the Schedule of Courses, plus TA and faculty office hours when available. You also may find current information on pre-advising and registration. Our Vernon Van Dyke Computing Facility (Political Science ITC) is located in room 21 Schaeffer Hall. Available hours are listed at our web site and also posted outside room 21 SH.