Course description

This class will introduce you to a variety of statistical techniques relevant to political science. 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 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 tool through which you will familiarize yourself with these methods is 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: class participation during discussion sessions (15%), homework assignments (35%), three in-class short-answer quizzes (15%) and a final project involving a poster presentation (25%) and the circulation of replication materials (10%) at the end of the semester.

Course Requirements

1. Class participation.
   Class time will be divided between lectures, discussion and computer work - you will be assigned readings that explain and apply the methods we cover. You are expected to complete the reading before class and come prepared to discuss it. For substantive material, this implies the ability to answer the following questions: 1) What is the central research question?
2) What is the method used to test that hypothesis? and 3) What is the advantage of using that method?

2. Homework.
   The best way to learn the material is to use the models. I will assign homework on a weekly to bi-weekly basis. Most 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.

3. Quizzes
   There will be three in-class quizzes. These will take about 15-30 minutes and will involve short-answer questions asking to explain the way different methods work. The emphasis will be explanation through words not equations, though some of the latter may be needed for clarity.

4. Final Project
   a. Poster Presentation.
      At the end of the semester (exact date TBA, but probably the Friday of the penultimate week of classes), class members will present the results of their research project to the department in poster format. Guidelines for poster presentations are included on the Department’s Resources for Graduate Students web page; additional materials may also be circulated. The focus of the poster 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.

      Posters must also meet the following criteria (adapted to the three options as appropriate):
      i. No fewer than 8 and no more than 12 panels (page equivalents).
      ii. One page 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 page must present a graphical (or tabular, but only if necessary) interpretation of the main result.
      iv. One page must indicate the primary hypothesis being tested.
      v. One page must clearly indicate the data and/or methods employed.

      You must upload a copy of your poster to ICON by the end of the semester for grading purposes.

   b. Replication Materials.
You will submit a complete set of replication materials through ICON at the end of the semester. 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 do-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 do-file to run all the analysis in your poster, including the creation of the quantities of interest in the interpretation slide.

**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.

**Books**

There are two books assigned for the class. Both are on reserve at the library, but I highly recommend ordering a copy for yourself.


These books are also good to have around for reference and will be useful for topics covered in the class. The first four of them are also on course reserve at various libraries on campus.


**Introduction**

Long, Chapter 1.


**Discrete Choice Analysis: Logit and Probit**

Long, Chapters 3-4.

**Discrete Choice Analysis: Ordered Logit and Probit**

Long, Chapter 5.


**Discrete Choice Analysis: Multinomial Logit and Probit**

Long, Chapter 6.


**Discrete Choice Analysis: Heteroskedastic Probit**


**Count Models: Poisson Regression**

Long, Chapter 8, Sections 1 and 2.


**Count Models: Negative Binomial Regression and the GEC Model**

Long, Chapter 8, Section 3.


**Count Models: Hurdle, Zero-Inflated and Seemingly Unrelated Count Models**

Long, Chapter 8, Sections 4-7.


**Duration Analysis: Introduction**

Long, Chapter 9, Section 4.


**Duration Analysis: Discrete Time Models**


**Duration Analysis: Duration Dependence in Discrete Time Models**


**Duration Analysis: Parametric Continuous Time Models**


**Duration Analysis: Duration Dependence in Parametric Continuous Time Models**


**Duration Analysis: The Cox Model**


**Duration Analysis: Repeated Events and Competing Risks**


**Duration Analysis: Additional Topics**


Box-Steffensmeier, Janet M.; Dan Reiter; and Christopher Zorn. 2003. “Nonproportional Hazards and Event History Analysis in International Relations.” *Journal of Conflict Resolution*.


**Other Information:**

Please visit the Political Science Department’s Website at [http://www.uiowa.edu/~polisci](http://www.uiowa.edu/~polisci). It is frequently updated regarding events and procedures in our department, changes in the Schedule of Courses, plus TA and faculty hours when available. You may also 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 website and also posted outside Room 21 Schaeffer.