

Graduate Statistics III

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Political Science 5384

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Contact Information

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Course Introduction:

This course presents an overview of several advanced regression techniques used in political science today. The course will focus on maximum likelihood estimation for models of various kinds of limited dependent and qualitative dependent variables. Specific topics will include binary logit and probit, multinomial logit and probit, ordered logit and probit, Poisson regression and other models for events counts, and duration models.

Any methods course requires some knowledge of basic statistical concepts and techniques. While we won't dwell on statistical theory, we will begin with a brief review to insure familiarity with concepts such as descriptive statistics, sampling distributions, statistical inference, and hypothesis testing before moving on to the applied techniques central to the course. These models are among the most widely used in political science; these techniques increasingly represent the minimal level of statistical competence necessary to publish quantitative work in political science. Understanding these models will make you both a better consumer and producer of political science literature.

Course Objectives

- Calculate and interpret coefficients for a variety of maximum likelihood models. (Method of Assessment: Homework assignments and Final Paper)
- Recognize a variety of data generating processes. (Method of Assessment: Homework assignments and final paper)

- Select the correct methods for modeling a variety of non-continuous outcome variables. (Method of assessment: Homework assignments and final paper)
- Perform a series of diagnostics for maximum likelihood models. (Method of Assessment: Homework assignments and final paper)
- Calculate and interpret predicted probabilities. (Method of Assessment: Homework assignments and final paper)

Expectations

- Come to class. I know that seems like an obvious one, but it's important nonetheless. Learning statistics is a cumulative practice; what we learn in one class will build upon what was covered in previous sessions. Missing class creates gaps in your knowledge that will be difficult to build on.
- Complete all assignments. Much like the practice required for learning a foreign language, you'll have to practice the techniques we learn in this class to get them to stick, and the homework is a good way to do that. These exercises will also help you familiarize yourself with the software packages necessary to perform even simple analysis in a timely fashion.
- Keep an open mind about the math. This course assume no previous exposure to calculus or statistics, and we will walk through the essential mathematical concepts in a way I hope will be clear to everyone. If at any point, it is not clear, please let me know.

Readings

The readings for this course will be drawn from several sources. The only book that is required for the class is available at the bookstore:

- Long, Scott. 1997. *Regression Methods for Categorical and Limited Dependent Variables*. Sage.

A large number of additional readings appear on the syllabus and a few extras may be added as the semester progresses. These will either be handed out during class or are available via JSTOR.

Additional Useful References

- Agresti. 1990. *Categorical Data Analysis*. New York: Wiley.
- Eliason, Scott. 1993. *Maximum Likelihood Estimation: Logic and Practice*. Sage. (Very helpful)

- Gill, Jeff. *Generalized Linear Models: A Unified Approach*. Sage.
- Greene. 2003. *Econometric Analysis*, 5th ed. Upper Saddle River, NJ: Prentice Hall.
- Hosmer, David and Stanley Lemeshow. 1999. *Applied Survival Analysis: Regression Modeling of Time to Event Data*. New York: Wiley.
- King, Gary. 1989. *Unifying Political Methodology: The Likelihood Theory of Statistical Inference* Ann Arbor, University of Michigan Press. (Political science examples)
- Liao, Tim Futing. 1994. *Interpreting Probability Models: Logit, Probit and Other Generalized Linear Model*. Sage.
- Maddala. 1983. *Limited Dependent and Qualitative Variables in Econometrics*. Cambridge University Press. (Chris Zorn says “A bit dated, but still an excellent resource.”)

Course Requirements

The requirements for this course a series of homework assignments and a final paper. These elements are weighted as follows:

- Homework 50%
- Final Paper 50%

Late assignments All work for the course must be handed in on time. Late papers will be penalized one full letter grade for each day past the deadline. If papers will be unavoidably late due to illness or other serious impediment to school work, please alert me as soon as possible and an extension may be offered at my discretion. No makeup exams will be offered, unless unusual circumstances such as serious illness, university sanctioned events, or extreme family crisis arise. A letter from the college office will go a long way toward convincing me that you truly need a make up exam.

Academic Integrity Students will be expected to adhere to the university honor code for all assignments. Work handed in by any student should be solely the work of that student – end of story. If you draw on the ideas of others, please cite them. Failure to do some will result in a failing grade in the course.

ADA: Any student with a learning disability or physical handicap that might affect class performance should notify me as soon as possible. TTU can make a variety of arrangements that help insure equal opportunity. It is your right and we are glad to work with you on this. For necessary accommodations to be made, please let me know prior to the first exam. Students should present appropriate verification from AccessTECH.

Religious Observances: A student who intends to observe a religious holy day should make that intention known to the instructor prior to the absence. A student who is absent from classes for the observance of a religious holy day shall be allowed to take an examination or complete an assignment scheduled for that day within a reasonable time after the absence.

Course Outline

May 30: Math Review

May 31: Maximum Likelihood

- Long, Ch. 2

June 1: Dichotomous Choice Models

- Long, 34-60.

June 4: Dichotomous Choice Models

- Long, 61-112.

June 5: Bivariate Logit

- Day, Long, and Palmer. 2007. "Accounting for Endogeneity in the Success of UN Peacekeeping Missions."

June 6: Heteroskedastic Probit

- Alvarez, Michael and John Brehm. 1995. "American Ambivalence Toward Abortion Policy: A Heteroskedastic Probit Method for Assessing Conflict Values." *AJPS* 39: 1055-82.

June 7: Ordered Choice Models

- Long, 114-145.
- Gelpi, Chris. 1997. "Crime and Punishment: The Role of Norms in Crisis Bargaining." *APSR* 91(2):339-60.

June 8: Lab Session

June 11: Unordered Choice Models

- Long, 148-178.

June 12: Unordered Choice Models

- Whitten, B. Guy and Harvey Palmer. 1996. "Heightening Comparativists' Concerns for Model Choice: Voting Behavior in Great Britain and the Netherlands." *AJPS* 92:159-71.

June 13: Conditional Logit

- Long, 178-182.
- Maltzman, Forrest and Paul Wahlbeck. 1996. "May it Please the Chief? Opinion Assignments in the Rehnquist Court." *AJPS* 40:421-443.

June 14: Lab Session

June 15: Count Models

- Long, 217-230.

June 18: Count Models

- Long, 230-238.
- Gowa, Joanne. 1998. "Politics at the Water's Edge: Parties, Voters and the Use of Force Abroad." *International Organization* 52:307-24.

June 19: Lab Session

June 20: Selection Models

- Dubin and Rivers. 1989/1990. "Selection Bias in Linear Regression, Logit, and Probit Models." *Sociological Methods and Research* 18: 360-90.
- Winship and Mare. 1992. "Model for Sample Selection Bias." *Annual Review of Sociology* 18: 327-350.

June 21: Selection Models

- Reed, William. 2000. "A Unified Statistical Model of Conflict Onset and Escalation." *AJPS* 44(1): 94-93.

June 22: Lab Session

June 25: Duration Models

- Box-Steffensmeier, Janet M. and Brad Jones. 1997. "Time is of the Essence: Event History Models in Political Science." *AJPS* 41: 1414-1461.

June 26: Duration Models

- Box-Steffensmeier, Janet M., Laura W. Arnold, and Christopher J. Zorn. 1997. "The Strategic Timing of Position Taking In Congress: A Study of the North American Free Trade Agreement." *APSR* 90: 324-338.
- Allen, Susan Hannah. 2005. "The Determinants of Economic Sanctions Success and Failure." *International Interactions* 31(2): 117-138.

June 27: Duration Models

- Bennett, D. Scott. 1998. "Parametric Models, Time-Dependence, and Time-Varying Data Revisited." *AJPS* 42.
- Zorn, Christopher J. 2000. "Modeling Duration Dependence." *Political Analysis*. 8(3).

June 28: Lab Session