PS2701
ADVANCED METHODOLOGY: LONGITUDINAL ANALYSIS
Wednesday 6-8:30 PM, 4801 Posvar Hall
Steven E. Finkel
4804 Posvar Hall
finkel@pitt.edu
Office Hours: W 2-3:30
Telephone: 412-648-7283

Course Description
This course aims to provide students with an overview of statistical methods appropriate for the analysis of longitudinal data, or data collected on multiple units (individuals, states, dyads, countries) at more than one point in time. The majority of the course will focus on models for the analysis of "panel data," which (by convention) is used to describe data with relatively large number of units and relatively few time points. Shorter sections focus on models for "time-series-cross-section data" (fewer units and many time points) and "event history analysis," which is used to model whether and when certain events occur (e.g. war, cabinet dissolution, Senate confirmation of Supreme Court justices).

The emphasis throughout the class will be on taking advantage of the benefits that longitudinal data provide the researcher in making inferences about causal dynamics, while at the same time being sensitive to the specific problems and complexities that emerge when conducting longitudinal analyses.

On the benefits side, longitudinal data provides the researcher with increased ability to:
1) model directly individual-level change and growth in dependent variables;
2) test alternative lag structures and models of reciprocal causality between variables;
3) estimate causal effects after controlling for the confounding effects of measurement error;
4) estimate models that control for unmeasured unit-specific effects or "unobserved heterogeneity;"
5) estimate models that specify and account for variation in individual-level intercepts, slopes and/or rates of change over time; and
6) estimate the "hazard" of an event occurring at given points in time, and the factors that influence the hazard over time.

Obstacles in achieving these goals abound however, and are made more difficult by several problems that are commonly found in longitudinal analyses, such as autocorrelated disturbances, missing data and panel attrition. We will consider all of these issues as we progress through the course.

A note on the level of mathematical/statistical difficulty in the course: This is not formally a "statistics" class; that is, there will not be an emphasis on derivations of appropriate statistical estimators and so forth. Rather, the emphasis will be on grasping the underlying logic of the various models, understanding how, when and why to use them to achieve the goals specified above in your own research, and learning how to profit from, and to critique, published works in the discipline that make use of these techniques. There will be a reasonable amount of mathematics, formulae, etc. that will be needed to understand the various models and methods, but all of it will be presented in ways that, ideally, will help guide your own research endeavors. I am assuming only that you have had basic courses in regression and the linear model, some exposure to maximum likelihood estimation, and perhaps to structural equation modeling as well.

Texts

Supplemental References:
Requirements

Grades will be based on a 20-25 page research paper (40%), three homework exercises which relate to specific statistical methods and problems we will discuss (15% each), and an oral presentation (with Power Point and/or related materials) of your research paper on December 7 (15%). The paper will be a quantitative analysis of longitudinal panel data using methods from this course of data that you will collect or access from social science archives or other sources. The paper should have some substantive interest to you or be relevant to your studies in the graduate program; ideally, you can think of it as the first draft of a convention paper or possible journal publication (see King, Gary. 2005. "Publication, Publication." PS: Political Science and Politics). The paper will discuss your basic theoretical framework, your hypotheses, statistical models, results, possible problems with the analysis and what you may have done to correct or account for these problems. It will conclude with a discussion of the relevance of your findings for the general topic and for future research. The final version of the paper should also incorporate the comments, critiques, and suggestions from your presentation the class. The paper will be due on December 12.

The homework exercises will be periodic problems or data to analyze and will illustrate aspects of the statistical techniques being covered in class.

Course Outline

The course is organized by units and then topics within units. We will maintain a certain amount of flexibility with the schedule, so that we can spend more time on some topics/units and scale back on others as circumstances warrant.

[NOTE: SEPTEMBER 7 CLASS TO BE RESCHEDULED]

August 31: Course Introduction

UNIT 1: Structural Equation Panel Models (September 14, 21, 28)

1. Review of Structural Equation Modeling and Introduction to (or Review of) LISREL
   Kaplan, David, Structural Equation Modeling, chapters 1-2, 6.

2. Cross-Lagged and Synchronous Effects Models
   Finkel, chapters 1-3.

Application:

3. Measurement Error
   Finkel, chapter 4.
   Kaplan, David, Structural Equation Modeling, chapter 3-4.

Application:

HOMEWORK 1 HANDED OUT SEPTEMBER 28, DUE OCTOBER 5
UNIT 2: Unobserved Heterogeneity and Dynamic Panel Models
(October 5, October 11)

1. Fixed and Random Effects Models
Stata Commands and Descriptions of: XT, TSSET, XTDES, XTREG, XTLOGIT, CLOGIT

Application:

2. Dynamic Panel Models and Endogenous Regressors
Stata Commands and Descriptions of: XTABOND, XTIVREG, XTREGAR

Application:

UNIT 3: Hierarchical, Random Coefficient and Latent Growth Models
(October 12, 19, 25*)

1. Multilevel (Hierarchical) Longitudinal Models

Application:

2. Hierarchical Generalized Linear Models (for Binary and other Non-Continuous DVs)
Stata Commands and Descriptions of: XTPROBIT, XTGEE

Application:

3. Latent Growth Models

4. Missing Data

HOMEWORK 2 HANDED OUT OCTOBER 19, DUE OCTOBER 25

UNIT 4: Event History Analysis (November 2, 9, 16)

Application:

HOMEWORK 3 HANDED OUT NOVEMBER 16, DUE NOVEMBER 30

UNIT 5: Models for Time-Series Cross-Section Data (i.e. Larger T, smaller N) (November 30)
Stata Commands and Descriptions of: XTGLS, XTPCSE

Application:

December 7: Paper Presentations

PAPERS DUE DECEMBER 12