PSC 8124: Multilevel and Longitudinal Modeling
Department of Political Science ● George Washington University
Fall 2016 ● Mondays, 11:10 – 1:00pm ● 2020 K St., Rm. 27

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Office hours: Open-door policy for graduate students or email to schedule appointment.

COURSE DESCRIPTION

The primary goal of the course is to highlight the core theoretical and statistical issues that accompany multilevel and hierarchical (aka, “clustered”) data, where observations from one level of analysis are nested within observations from a higher level of analysis (e.g., students nested within schools). The class will (1) emphasize the unique substantive opportunities that accompany multilevel modeling frameworks and (2) introduce and secure an understanding of the range of different models that fall under the multilevel modeling umbrella. We will discuss “classic” types of hierarchical data (e.g., students nested within schools; voters nested within countries; countries nested within regions) and also a particular type of longitudinal data, i.e., panel and “time-series cross-sectional” (TSCS) data. Note that we will NOT be covering “time series analysis” per se, where, e.g., one is analyzing quarterly stock market data in the U.S. over a long period of time or a particular country’s annual GDP over time.

The class will cover topics such as unobserved heterogeneity; complete pooling, partial pooling and no pooling modeling approaches to multilevel data; the simple “variance components” model; the random intercept (aka, “random effects”) model; substantive and statistical issues surrounding fixed versus random effects models; modeling causal heterogeneity via the random coefficient model; cross-level interactions; multilevel modeling applications to time-series cross-sectional and panel data; and beyond. We will place a large emphasis on linear models, but we will hopefully venture into nonlinear models as well, particularly models for binary dependent variables. For each model discussed, a special focus will be placed on interpretation of effects, assessing goodness of fit, model comparison, and generating post-estimation quantities of interest for richer substantive interpretation. The course will feature extensive use of applied data examples and will expose students to the full suite of commands available in Stata software for estimating multilevel models. Comparisons to additional software packages will be explored and discussed as time permits.

TEXTBOOKS


Both books are useful as textbooks and applied R and Stata manual of sorts. Note that the third edition of the Rabe-Hesketh and Skrondal book has now been expanded into two volumes. Volume 1 covers continuous dependent variables and Volume 2 covers categorical dependent variables.
variables. I am not requiring the third edition, though you are free to purchase that, either through Amazon or Stata Press. Both books are very valuable for future reference.

SOFTWARE
We primarily use Stata. Time permitting, we will use R as well. If you don’t have Stata on your computer, it will be available to use for free via the CCAS Cloud. As you all know, R is free.

LEARNING OUTCOMES:
As a result of completing this course, students will:
1. Possess a comprehensive understanding of the methodological issues surrounding multilevel and longitudinal data.
2. Be prudent methodological consumers and practitioners when it comes to interpreting and applying these types of models.
3. Be able to write a paper—using the methods discussed in class—capable of being published in a professional journal.
4. Be able to write a dissertation chapter using the methods discussed in class.

GRADING
1. **Class attendance and participation** (10%): Students are expected to complete all of the assigned readings and to have thought about those readings, to attend each class, and to participate in class sessions.

2. **Problem sets** (50%): We will have problem sets due every other week (7 total). During each class session, I will try to leave free “lab time” where students can work together on problem sets and I can offer assistance as well.

   Important notes on problem sets:
   - Please email your assignments to me. I’ll give further instructions later.
   - Feel free to work with your classmates on the problem sets. Collaboration can be beneficial for mastering the material. However, you must do your own work. That is, while you can work together, the final product that you hand in must be your own work.

3. **Final paper** (40%): There are two options for the final paper: **First**, you can write a full-fledged research paper using the skills you have learned throughout the class to analyze and write up results from an empirical analysis using data that you have gathered, downloaded, etc. The paper should also include a brief introduction, a characterization of the literature, a section devoted to theory and hypotheses, etc. Importantly, the paper project is intended to give you practice toward mastering the art of writing a research paper, in particular, discussing results and how they relate back to the substantive research question(s), the theory, and hypotheses. The paper should resemble what you would submit to a professional conference or an academic journal. **I strongly encourage you to think about your research question very early in the semester and to make progress on the paper gradually throughout the semester.** If you can write something related to your dissertation or core area of interest, that is ideal, though not completely necessary. Students should touch base with me about
their papers—particularly regarding the data they are interested in analyzing—sometime before the middle of the semester.

**Second**, students can write a *replication paper*. This will also be a full-fledged paper that reanalyzes an already-published article in a peer-reviewed academic journal. More and more journals are requiring authors to post their data on a public website before their article is published. The *American Journal of Political Science* has been doing this since 2012. For journals that do not require authors to post their data, many authors make their data available via their websites. In the replication paper, you should think about how you want to reanalyze the paper, what additional analyses you think should be conducted, and how such analyses might make a substantive contribution. While you should seek to replicate what the authors actually did, I want you to go beyond what the authors did and produce additional analyses that you believe are substantively important and interesting and capable of being published on a peer-reviewed journal.

**Due date**: Finals week.

**CLASS POLICIES**

*University Policy on Religious Holidays:*

1. Students should notify faculty during the first week of the semester of their intention to be absent from class on their day(s) of religious observance;
2. Faculty should extend to these students the courtesy of absence without penalty on such occasions, including permission to make up examinations;
3. Faculty who intend to observe a religious holiday should arrange at the beginning of the semester to reschedule missed classes or to make other provisions for their course-related activities

**ACADEMIC INTEGRITY**

I personally support the GW Code of Academic Integrity. It states: “Academic dishonesty is defined as cheating of any kind, including misrepresenting one's own work, taking credit for the work of others without crediting them and without appropriate authorization, and the fabrication of information.” For the remainder of the code, see: [http://www.gwu.edu/~ntegrity/code.html](http://www.gwu.edu/~ntegrity/code.html)

**SUPPORT FOR STUDENTS OUTSIDE THE CLASSROOM**

*DISABILITY SUPPORT SERVICES (DSS)*

Any student who may need an accommodation based on the potential impact of a disability should contact the Disability Support Services office at 202-994-8250 in the Marvin Center, Suite 242, to establish eligibility and to coordinate reasonable accommodations. For additional information please refer to: [http://gwired.gwu.edu/dss/](http://gwired.gwu.edu/dss/)

*UNIVERSITY COUNSELING CENTER (UCC) 202-994-5300*

The University Counseling Center (UCC) offers 24/7 assistance and referral to address students' personal, social, career, and study skills problems. Services for students include:

- crisis and emergency mental health consultations
- confidential assessment, counseling services (individual and small group), and referrals [http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices](http://gwired.gwu.edu/counsel/CounselingServices/AcademicSupportServices)
SECURITY
In the case of an emergency, if at all possible, the class should shelter in place. If the building
that the class is in is affected, follow the evacuation procedures for the building. After evacuation,
seek shelter at a predetermined rendezvous location.

COURSE OUTLINE

I. Motivation and Core Issues

II. Linear variance components model

III. Random intercept model (aka, random effects model) and its alternatives (e.g., OLS, fixed
effects, “between” effects)

IV. Cluster confounding

V. Longitudinal modeling for time-series cross-sectional (TSCS) and panel data.

VI. Random coefficient model

VII. Nonlinear models for noncontinuous dependent variables
A Sampling of Recommended Readings

I. Hierarchical Modeling Readings


II. Time-Series Cross-Sectional and Panel Data

1. *The Original Beck and Katz Approach to TSCS Data*


   Application articles:


2. *The Fixed Effects Approach*


   Application articles:


3. *The Random Effects Approach; Fixed versus Random Effects*


Application articles:


4. *Fixed versus Random Effects; Modeling Dynamics in Panel and TSCS Data*


Application articles:
