🏠   **PURDUE** UNIVERSITY®️   Spring 2021 SOC 68100-001 LEC

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Syllabus

SOC 681: Multilevel and Longitudinal Models

Spring 2021 | MW 9:00-10:15 | online

Instructor: Shawn Bauldry (sbauldry@purdue.edu)

Course Description

In this course we will explore a range of models appropriate for multilevel and longitudinal data. We will see that a random effects model for multilevel data in which individuals are nested within social contexts can also be used for longitudinal analysis in which repeated measures over time are nested within individuals. We will also learn about survival (or event history) models that are typically used to analyze the time it takes to experience an outcome (e.g., the age of first marriage, the number of months spent unemployed, the number of years people live).

As an applied statistics course, I will place a greater emphasis on the connections between substantive research questions and statistical models and the practical aspects of coding the models and interpreting the results than on mathematical derivations. I assume that students are proficient with linear regression models and are familiar with categorical regression models.

Learning Outcomes

- Specify a research question appropriate for a contextual data, fit a multilevel model, and interpret the results.
- Specify a research question appropriate for a longitudinal data, fit a longitudinal model, and interpret the results.
- Specify a research question appropriate for a survival data, fit a survival model, and interpret the results.

Course Details

Texts

There is no required textbook for this course. All of the material that you need will be provided in the slides that will be made available on Brightspace.

For those of you interested in a textbook, my primary recommendation is:

- Rabe-Hesketh and Skrondal. 2012. *Multilevel and Longitudinal Modeling Using Stata*.

The following are also good texts if you'd like additional resources.

- Bollen and Curran. 2006. *Latent Curve Models: A Structural Equation Perspective*.

- Gelman and Hill. 2007. *Data Analysis Using Regression and Multilevel/Hierarchical Models*.

- Singer and Willett. 2003. *Applied Longitudinal Data Analysis*: …

- Snijders and Bosker. 2012. *Multilevel Analysis: An Introduction …*

Statistical Software

The statistical models we cover in this course can be fit using a variety of statistical software packages. I will provide instruction for fitting the models in R and Stata. R is available for free download and I recommend using the RStudio interface. Stata is available for free to Purdue students at OnTheHub. If you are already familiar with another statistical software package, then you are welcome to use it.

Grades

Your grade for the course will be based on three components: (1) three assignments, (2) two reading presentations, and (3) one reading response paper.

Assignments (20 points per assignment) During the semester there will be a series of assignments related to the models we've covered in class that will typically involve some form of analysis and interpretation. I will provide information about how to obtain the data (either via Brightspace or downloading from an online source) in the assignment. The assignments should be prepared as Word documents (or some other word processing program) and should not consist of raw output or code. The assignments should be submitted on Brightspace You are welcome to work collaboratively on the assignments, but I expect that everyone will submit their own assignment.

Assignment due dates: February 19, March 19, April 23

Reading Presentations (10 points per presentation) Throughout the semester we will dissect examples of empirical research published in leading journals that involve various forms of multilevel or longitudinal analyses (see list below). Most weeks I will assign one article and a few reading questions to guide our examination. Everyone should prepare notes on the questions and 2-3 volunteers will lead our discussion with a short presentation (roughly 5 minutes). The presentation should provide a brief summary of the research question(s) and then offer thoughts on the reading questions.

Sign-up sheet for presentations: link

Reading Response Paper (20 points) At the end of the semester you will need to complete a short response paper (roughly 1000 words) that provides an assessment of one of the empirical articles (or an article of your choosing). The response paper should include the following: (1) a brief summary of the research question(s), (2) a discussion of the statistical models and how they connect with the research question(s), and (3) your assessment of the strengths and limitations of the analysis. Due: April 30.

Reading Presentation/Response Articles

- Multilevel Analysis
  - Lu, Y and X Yang. 2020. "The Two Faces of Diversity: The Relationship between Religious Polarization, Religious Fractionalization, and Self-rated Health." *Journal of Health and Social Behavior* 61:79-95.
  - Li, A and M Fischer. 2017. "Advantaged/Disadvantaged School Neighborhoods, Parental Networks, and Parental Involvement in Elementary School." *Sociology of Education* 90:355-377.
  - Bakhtiari, E, S Olafsdottir, and J Beckfield. 2018. "Institutions, Incorporation, and Inequality: The Case of Minority Health Inequalities in Europe." *Journal of Health and Social Behavior* 59:248-267.
- Longitudinal Analysis
  - Thomeer, M. 2016. "Multiple Chronic Conditions, Spouse's Depressive Symptoms, and Gender within Marriage." *Journal of Health and Social Behavior* 57:59-76.

- Villarreal, A and C Tamborini. 2018. "Immigrants' Economic Assimilation: Evidence from Longitudinal Earnings Records." *American Sociological Review* 83:686-715.
- Johnson, M, R Horne, and F Neyer. 2019. "The Development of Willingness to Sacrifice and Unmitigated Communion in Intimate Partnerships." *Journal of Marriage and Family* 81:264-279.
- Survival Analysis
  - Kadivar, M. 2018. "Mass Mobilization and the Durability of New Democracies." *American Sociological Review* 83:390- 417.
  - Kraehnert, K, T Brück, M Di Maio, and R Nisticò. 2019. "The Effects of Conflict on Fertility: Evidence from the Genocide in Rwanda." *Demography* 56:935-968.
  - Keita, S and J Valette. 2019. "Natives' Attitudes and Immigrants' Unemployment Durations." *Demography* 56:1023-1050.

Accommodations

If you are student with a disability or ongoing medical condition, we can discuss appropriate accommodations. For additional information and resources please visit the Disability Resource Center.

Course Schedule

Unit 1: Multilevel Models

Week 1 Introduction   **Week 2** Linear regression

Week 3 VC and RI model   **Week 4** RC model

Week 5 Binary outcomes (no class on 17th)

Unit 2: Longitudinal Models

Week 6 Data structures, dynamic model   **Week 7** GEE, FE model

Week 8 Multilevel growth model   **Week 9** Latent growth model

Unit 3: Survival Models

Week 10 Data structures, censoring   **Week 11** Non-parametric methods

Week 12 Discrete-time model   **Week 13** Cox model

Week 14 Continuous-time models   **Week 15** TBD