Course Syllabus
USP 656 Advanced Data Analysis: Multilevel Regression
Winter 2016, Tues 1:00-3:50

Instructor
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Text

Recommended Text

Optional (not at the PSU bookstore)


Overview
This course is intended to introduce students to multilevel regression techniques (also known as hierarchical linear models or random coefficient models) and will cover the fundamental concepts and application of the techniques. By the end of the course, students should be able to apply, write about, critique applications of, and read methodological articles about multilevel regression analysis.

Prerequisites
This course assumes that students have taken a graduate statistics course that covers simple and multiple regression.

Readings and Commentaries
There will be several assigned each week taken from the text and other articles. Readings will typically include at least one didactic article and at least one example article. Students will be required to turn in a one-page commentary on the readings for that week on each Tues by 10 am. The commentaries should be an informal set of questions, comments, or summary information (summarize only if you cannot think of anything else to say) about the articles. The purpose of the commentaries is to make sure the class is prepared for discussion and to help the instructor identify discussion topics and sources of confusion in the readings.

Homeworks
There will be three homework assignments consisting of data analysis and reporting of multilevel regression problems using R, SPSS or the student version of the multilevel package, HLM 7 (Raudenbush, Bryk, Cheong, Congdon, & du Toit, 2011; Scientific Software International). The student version of HLM can be downloaded from the following internet site: http://www.ssicentral.com/hlm/student.html. It is unlikely that you will need to refer to the manual, but much of the information is available under the help function of the package.
Homework due dates are: Tues 2/2, Tues 2/23, Tues 3/15. Late assignments are not accepted except for cases of illness or family emergencies. Please contact me ahead of time if you are going to miss the deadline for any reason.

Grades
Grades are based on an average of the three homework assignments, completion of reading commentaries, and satisfactory participation in class.

Other Resources
There are several useful electronic links on the class website. Of particular note is a website devoted to multilevel analysis with links to software and other useful information is at http://www.cmm.bristol.ac.uk/links/index.shtml. I also suggest that you subscribe to the multilevel listserv at: http://www.bristol.ac.uk/cmm/learning/support/jisc.html (a digest format is available). A great deal can be learned from seeing questions and answers from other researchers wrestling with multilevel analysis issues.

Disabilities
If you have a disability and are in need of academic accommodations, please notify me immediately to arrange needed supports.
Course Readings
USP 656 Advanced Statistics: Multilevel Regression
Winter 2016

All supplemental readings available online at the class website: http://www.upa.pdx.edu/IOA/newsom/mlrclass


1/12 Regression Review & Overview of Multilevel Regression
- S & B, Chapter 1 & Chapter 2.
- Kreft & de Leeuw, pp. 1-8


1/19 Random vs. Fixed Coefficients, Random Intercept Models, Intraclass Correlation Coefficient
- Kreft & de Leeuw, pp. 10-12.
- S & B, Chapter 4, Sections 4.1 - 4.5 and Section 4.9 only. *(Optional: Chapter 3).*

1/26 Full Multilevel Regression Models, Part I: Varying Slopes, Hypothesis Tests, Explained Variance, Model Building
- S & B, Chapter 5, except Sections 5.2 and 5.3.1, Chapter 6.

2/2 Homework 1 Due

2/2 Full Multilevel Regression Models, Part II: Cross-level Interactions & Centering
- S & B, Chapter 5, Section 5.2 only (cross-level interactions)
- S & B, Chapter 4, Section 4.6 only, Chapter 5, Section 5.3.1 only (centering)

2/9 Estimation Methods, Assumptions & Diagnostics

• S & B, Chapter 4, Sections 4.7 – 4.8 only (estimation).

• S & B, Chapter 10 (assumptions & diagnostics).

• Raudenbush & Bryk, pp. 266-280 (assumptions, diagnostics, remedies)

• S & B, Chapter 12, Sections 12.1 – 12.2 only (remedies).


2/16 Growth Curve Models, Part I: Linear Growth

• Singer & Willett, Chapter 2 & 3.

• Hox, Chapter 5, pp. 79-99


2/23 Homework 2 Due

2/23 Growth Curve Models, Part II: Extensions of Growth Curve Models

• S&B Chapter 15

• Singer & Willett, Chapter 6.


3/1 Binary and Noncontinuous Outcomes

• S&B Chapter 17

• Hox, Chapters 6 & 7.

• Example: Foster, H., & Brooks-Gunn, J. (2012). Neighborhood, family and individual influences on school physical victimization. *Journal of Youth and Adolescence*. Published online Dec 2012. DOI 10.1007/s10964-012-9890-


3/8 Missing Data, Sample Size Issues & Power

• S&B, Chapter 9 (missing data)

• Hox, Chapter 12 (sample size & power)

• S&B Chapter 11 (sample size & power)


3/15 (No class—finals week) Homework 3 Due 5 PM