Psychology 610: Multilevel Modeling
Winter 2013, Straub 143, T/Th 10:00 – 11:20

Instructor Information

Professor: Elliot Berkman
Office hours: Thursdays 11:30-1 or by appointment in 325 LISB
Contact info: berkman@uoregon.edu

Course overview

This course is intended to provide you with a thorough conceptual understanding of random coefficient multilevel modeling and to acquaint you with some of the mathematical/statistical underpinnings of this technique. In addition, this course will give you the opportunity to gain significant hand-on experience with the statistical software used to analyze multilevel models. At the conclusion of the course, my goal is that you will be sufficiently familiar with this class of models to be able to apply the techniques independently to your own data and critically evaluate empirical articles that employ these analyses.

Course Organization and Requirements

Recommended Background

The prerequisite for this class is a graduate course in multiple regression analysis. Multilevel analysis has developed out of the basic regression framework, and the concepts of multiple regression analysis often have multilevel analogs. Of course, not all graduate regression courses cover the same material. The lecture on estimation techniques and algorithms will assume familiarity with the matrix formulation of the regression equation, and the lecture on categorical outcomes will assume basic exposure to logistic regression techniques. If you are unfamiliar with matrix multiplication, the expression $b=(X'X)^{-1}X'y$, logistic response functions, or odds ratios, I would strongly suggest that you review the relevant sections of a basic regression text. For example, check out:

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (1983). Applied multiple regression/correlation analysis for the social sciences. Hillsdale, NJ: Erlbaum.

Pedhazur, E.J. (1997). Multiple regression in behavioral research: Explanation and prediction, 3rd edition. Fort Worth, TX: Harcourt Brace College Publishers.

Required Readings

Raudenbush, S.W., & Bryk, A.S. (2002). Hierarchical linear models: Applications and data analysis methods, 2nd ed. Thousand Oaks, CA: Sage. (*Called "R&B" in schedule below*.)

Singer, J.D. (1998). Using SAS PROC MIXED to fit multilevel models, hierarchical models, and individual growth models. *Journal of Educational and Behavioral Statistics, 23*, 323-355.

Additional substantive articles in preparation for class discussions.

Homeworks

Performance in this course will be evaluated through two homework assignments. Homework assignments are due as outlined in the Course Schedule below. The homework assignments are quite extensive, and each requires a substantial amount of computer work. I strongly recommend you begin work on the homework assignments as soon as they are handed out rather than waiting until shortly before the due date. This will allow you enough time to complete the homework and an opportunity to ask questions in class or during my office hours and still turn the assignment in on time. Late assignments will only be accepted with prior permission, and the total number of points earned will be reduced by the equivalent of 1/2 a letter grade for each day after the due date. No late assignments will be accepted after graded assignments have been returned to the class.

Grading

Total homework points will determine your course grade. Your scores will be combined and weighted to yield one score out of 100%. I will average the top 10 scores from class, and use that number to determine the cutoff for letter grades. To get an A- you will need to get 90% of the average top score, to get a B- you will need to get 80% of the top score, and so on. If everyone does poorly on the paper nobody suffers, and it is also possible for every single person to get an A (since you could all do as well as 90% of the mean of the top 10 students).

Computing

Every homework assignment will involve substantial computing work. In this course, our primary tools will be SAS and HLM. Current versions of both programs are available in the Psychology computing labs. The HLM software is a free student version (available for download at www.ssicentral.com/hlm/student.html) that differs from the full version only in that the number of observations and variables it can handle is limited. Homework assignments will be designed with these limitations in mind. If you are using your own computer and software, make sure that you have SAS version 8 or later (the current version is 9.13) and HLM 6.0 or later (the current version is 6.04). SAS documentation can be found at support.sas.com/onlinedoc/913/docMainpage.jsp. HLM documentation is available within the program from the help menu.

Course Website

The Blackboard site for this course is at **http://blackboard.uoregon.edu.** Course documents, including this syllabus, copies of my slides, articles for discussion, and homework assignments will be posted there. Links to SAS help and the HLM webpage can also be found there.

Other Policies

Late/missed assignments. The first homework will be due on 2/14, and the second homework on 3/21. Late assignments will not be accepted unless previously arranged for good reason.

Plagiarism/Cheating. Always unacceptable and defeats the purpose of graduate school.

Students with special needs. The UO works to create inclusive learning environments. If there are aspects of the instruction or design of this course that result in disability-related barriers to your participation, please notify me as soon as possible. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

Course Schedule and Readings

Month	Day	Topic	Reading	HW Due
January	8	Multilevel data and traditional analytic approaches		
	10	Precursors to the multilevel random coefficient model		
	15	The two-level random coefficient model and submodels	R&B Ch 2, 4, 5	
	17	*No class: Elliot out of town*		
	22	Hypothesis testing and examples	R&B Ch 3	
	24	Computing	Singer 323-339	
	29	Articles	TBA	
	31	Shrinkage estimators	R&B Ch 4 85-94, Ch 5 152-158	
February	5	Centering	R&B Ch 2 31-35, Ch 5 134-149	
	7	Categorical outcomes	R&B Ch 10	
	12	Growth modeling I	R&B Ch 6 Singer 340-351	
	14	Growth modeling II		HW 1
	19	Three-level models	R&B Ch 8	
	21	Diary data		
	26	Estimation techniques and algorithms	R&B Ch 14	
	28	Assumption violation and diagnostics	R&B Ch 9 pp. 259-284	
March	5	Articles	TBA	
	7	Power and sample size issues		
	12	Dyads I (*Special guest lecture!*)		
	14	Dyads II (*Special guest lecture!*)		
	19			
Finals Week	*21*	**Homework 2 due at 10am**		