

**ITV Course: Multilevel Modeling  
Fall 2006, Wednesday, 1:30 – 3:30**

***Contact Information:***

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***Course Description and Objectives:***

Social science data frequently have a hierarchical or multilevel structure. Multilevel data structures exist when units of analysis at one level are grouped or clustered by units at a higher level of analysis. In survey research, for example, we collect individual-level data on each respondent. We may have information about respondents' party identification, race, education, and voting behavior. Depending on the design of the survey, these respondents can often be grouped into a higher unit such as a county, state, or nation. We may have data concerning the characteristics of these higher-order units such as racial diversity, income inequality, or type of government institutions. How much variance in a given dependent variable is explained by individual-level or aggregate-level factors? Does the intercept vary across groups? Do the effects of individual-level variables vary randomly or nonrandomly across groups or are they fixed? Multilevel data structures enable us to explore and answer these sorts of important questions.

While multilevel data present great theoretical opportunities, they also pose some statistical challenges. Hierarchical linear models are designed to meet these challenges and enable the analyst to exploit multilevel data structures for theoretical gain. This course provides an introduction to the use of hierarchical or multilevel models. The purpose of the course is to introduce students to the basic principles of hierarchical linear modeling, with particular emphasis on applications in political science research. Topics covered include an introduction to multilevel analysis, random intercept models, random slope models, three-level models, estimation and hypothesis testing, model building, nonlinear models, and longitudinal models.

***Assignments and Evaluations:***

Students will be evaluated based on their performance in three areas. First, there will be weekly computer exercises in which students will be required to conduct various analyses of multilevel data (40%). For purposes of these exercises, a common data set will be provided. Students are encouraged but not required to complete these exercises using *HLM6*, a software package developed specifically for multilevel analysis. If you choose not to use *HLM6*, you will need to employ some other software package with multilevel modeling capabilities. Second, each student is responsible for selecting and discussing two application readings before the class (20%).<sup>1</sup> Application readings should include either some type of multilevel analysis or multilevel data that could (or should) have been analyzed using multilevel methods. An incomplete list of

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<sup>1</sup> The details of this requirement are subject to revision based on final course enrollment.

application readings will be provided but you may select others as well. Finally, students will complete a writing assignment in the form of a research note (40%). These research notes, which should be approximately 10-15 pages in length, will require each student to conduct some original research and apply multilevel modeling techniques to a multilevel data set of his or her choice. They are due on December 6, 2006, which is three weeks after the course ends. Students are strongly encouraged to select an appropriate data set early in the course. Additional details concerning the writing assignment will be provided in the coming weeks.

***Required Textbooks:***

Snijders, Tom, and Roel Bosker. 1999. *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling*. Thousand Oaks, CA: Sage Publications.

***Other Useful Textbooks:***

Goldstein, Harvey. 2003. *Multilevel Statistical Models, 3<sup>rd</sup> edition*. New York, NY: Oxford University Press.

Hox, Joop. 2002. *Multilevel Analysis: Techniques and Applications*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Kreft, Ita, and Jan de Leeuw. 1998. *Introducing Multilevel Modeling*. Thousand Oaks, CA: Sage Publications.

Longford, Nicholas T. 1993. *Random Coefficient Models*. New York, NY: Oxford University Press.

Luke, Douglas A. 2004. *Multilevel Modeling*. Thousand Oaks, CA: Sage Publications.

Raudenbush, Stephen W., and Anthony S. Bryk. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods*. Thousand Oaks, CA: Sage Publications.

Reise, Steven P., and Naihua Duan, eds. 2003. *Multilevel Modeling: Methodological Advances Issues, and Applications*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Textbook Examples: <http://www.ats.ucla.edu/stat/examples/> (Note: This website provides many of the data sets discussed in the above mentioned books.)

***Recommended Software:***

Raudenbush, Stephen, Bryk, Anthony, and Richard Congdon. 2004. *HLM6: Hierarchical Linear and Nonlinear Modeling*. Lincolnwood, IL: Scientific Software International. (Note: Student versions of *HLM6* can be downloaded for free at <http://www.ssicentral.com/hlm/>)

*Assigned Readings (to be completed by the start of each class):*

**9/27 Introduction to Multilevel Models**

Snijders and Bosker: Chapters 1, 2, and 3

**10/4 Random Intercept Models**

Snijders and Bosker: Chapter 4

Steenbergen, Marco R., and Bradford S. Jones. 2002 “Modeling Multilevel Data Structures.” *American Journal of Political Science* 46(1):218-37.

**10/11 Random Slope Models**

Snijders and Bosker: Chapter 5

Bowers, Jake, and Katherine W. Drake. 2005. “EDA for HLM: Visualization When Probabilistic Inference Fails.” *Political Analysis* 13(4):301-26.

**10/18 Estimation and Hypothesis Testing**

Snijders and Bosker: Read pp. 56 – 63 and 82 – 83

Snijders and Bosker: Chapters 6 and 7

**10/25 No Class**

**11/1 Model Building**

Snijders and Bosker: Chapters 8, 9, and 10

Stoker, Laura, and Jake Bowers. 2002. “Designing Multilevel Studies: Sampling Voters and Electoral Contexts.” *Electoral Studies* 21:235-67.

**11/8 Nonlinear Models**

Snijders and Bosker: Chapter 14

**11/15 Models for Repeated Measures Data**

Snijders and Bosker: Chapter 12

**12/6 Research Papers Due (3 weeks after last class)**