SOCY7708: HIERARCHICAL LINEAR MODELING

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Office hours: by appointment
Class time: Wednesdays 9-11:30am
Class location: O'Neill 245
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Course Description

This applied course is designed for graduate students with a prior background in statistics at the level of SOCY7703: Multivariate Statistics (or its equivalent). This means that students should have considerable experience with multiple regression and an ability to conduct such analyses using some statistical software. The major topics of the course will include two-level models for continuous, categorical, and count outcomes, three-level models, growth curve models, models for couple data, and cross-nested models. We will use Stata software to perform the analyses; no prior knowledge of the software is required. For your assignments, you can use Stata on Citrix: see http://bcapps.bc.edu. Some additional helpful resources for learning Stata include http://www.ats.ucla.edu/stat/stata/ as well as Stata forum, Statalist: http://www.statalist.org/.

The goals of the course are to develop the skills necessary to identify an appropriate technique, estimate models, and interpret results for independent research and to critically evaluate contemporary social research using hierarchical linear modeling. The course will be applied in the sense that we will focus on estimating models and interpreting the results, rather than understanding in detail the mathematics behind the techniques.

Course Policies

In-class Activities: For each topic in the course, I will give a lecture focusing on the reasoning behind the techniques and an interactive review of the syntax used to do the analyses as well as the generated output. Throughout that process, you will get a chance to practice conducting the analyses and interpreting the results. We will also discuss and critically evaluate published research. Make sure that you carefully read these examples of published research before class and be prepared to discuss them.

Communication: You are strongly encouraged to ask questions and discuss the material in class. I also encourage collaboration among the students; you will be working closely with your peers and providing feedback on their projects. I also would like to stress that you are always welcome to come and see me with any additional questions – we can meet either in person or on zoom. Email is the best way to get in touch with me to get a quick question answered or to set up an appointment to discuss something at length. Please check your email regularly: I will send out announcements from time to time.

Coursework: Throughout the course, you are expected to do all your coursework on time. Ordinarily, no late assignments will be accepted. But I realize that it is a difficult time for many of you, so talk to me if you have some exceptional circumstances. Don't hesitate to reach out – I am here to help! Consistent with BC's commitment to creating a learning environment that is respectful of persons of differing backgrounds, I believe that every reasonable effort should be made to allow members of the university community to observe their religious holidays without jeopardizing their academic status. Students are responsible for reviewing course syllabi as soon as possible, and for communicating with the instructor promptly regarding any possible conflicts with observed religious holidays. Students are responsible for completing all class requirements for days missed due to conflicts with religious holidays.

Feedback: I would like to know how I could make this course experience as useful and interesting as possible. Therefore, after every class session, I will ask you to email me some feedback on that week,

indicating what you learned, what could have been done more effectively, and whether you have any questions or concerns or need further (or better) explanation. You may also send comments on the course in general. Please be honest in your comments – if something is unclear or doesn't work for you, I really do want to know about that and will not penalize you in any way!

Electronic Devices: As we will be learning online, you will in front of your computer the whole time. But please refrain from being distracted by the possibilities that provide – don't check any social media sites or news; don't check your messages and don't respond to them. Research demonstrates that these kinds of distractions diminish our ability to learn well. Checking messages, social media, and surfing the internet is also unprofessional and disrespectful to our class community. I appreciate your cooperation with this important aspect of creating a productive class environment.

Academic Integrity: It is your obligation to be fully aware of the Boston College policies on academic honesty. ANY violation may subject the offender to severe penalty, including course failure. If you are not familiar with the Boston College policy on academic integrity, see: https://www.bc.edu/bc-web/academics/sites/university-catalog/policies-procedures.html#academic_integrity_policies

Disability Accommodation: If you have a disability and will be requesting accommodations for this course, please register with either Dr. Kathy Duggan (dugganka@bc.edu), Associate Director, Connors Family Learning Center (learning disabilities or AHD) or Dean Rory Stein (rory.stein@bc.edu), Assistant Dean for students with disabilities (all other disabilities, including temporary disabilities). Advance notice and appropriate documentation are required for accommodations.

Health and Wellness: If you are feeling stressed, having challenges managing your time, sleep, or making choices around alcohol and food, the Office of Health Promotion (OHP) offers Individual and Group Health Coaching appointments with a trained Health Coach. Please reach out by going to OHP website or walk over to Gasson 025 and talk with a staff member. Be Well.

Diversity: It is my intent that students from all diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that the students bring to this class be viewed as a resource, strength, and benefit. It is my intent to present materials and activities that are respectful of diversity: gender identity, sexuality, disability, age, socioeconomic status, ethnicity, race, nationality, religion, and culture. Your suggestions are encouraged and appreciated. Please let me know ways to improve the effectiveness of the course for you personally, or for other students or student groups.

Required Materials:
The following book is available as an e-book through the BC library (BC owns 3 copies of this e-book, which allows simultaneous access for 3 people):
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.

If you would rather purchase your own copy, please visit https://www.routledge.com/Multilevel-Analysis-Techniques-and-Applications-Third-Edition/Hox-Moerbeek-Schoot/p/book/9781315650982

Other required readings will be available on electronic reserve in the library: http://www.bc.edu/reserves

COURSE REQUIREMENTS AND GRADING:

The main assignment for this course will be to write a journal article based on HLM analyses. In preparation for that, you will submit a proposal (10% of your grade), the first draft of your data analysis (5% of your grade), the first draft of your article (5% of your grade), and the final draft of your data analysis (30% of your grade) and article (30% of your grade). You will also provide peer feedback to two of your classmates (10% of your grade). In addition, there will be a few mini-assignments (questions about articles, coefficient interpretation exercises, etc.) throughout the semester; these will constitute another 10% of your grade.

All assignments should be submitted electronically (by email or using MyFiles, Dropbox, Google Drive, etc.). When you submit the first drafts of your analysis and article for peer review, please make sure to include me in your communication. Likewise, when sending the feedback to your peer, please send it to me as well. Finally, when you submit your final assignment to me, please make a one hour appointment with me (ideally during the finals week) to go over what you did.

Proposal. The proposal will involve identifying a research question and conducting preliminary literature review, selecting a dataset, and identifying relevant variables. You should also identify your target journal. Please consult me early on if you need help to locate appropriate data or advice on journals.

Data Analysis. For the first draft of your data analysis, you will conduct data management, run all the necessary analyses, conduct diagnostics and apply remedies, and write a brief interpretation of your findings (you will also use graphs to assist your interpretation). Drop the variables you do not plan to use and recode the variables for your analysis. Make sure to keep all ID variables in the dataset, decide on your strategy to deal with the missing data, and create any aggregate variables you might need for your analyses. For this component of your assignment, you will submit an annotated log that will contain the output (with your brief comments) for all of the tasks. There is no page limit for your annotated log but please edit it to contain only the relevant syntax, output, and graphs (i.e., omit any unproductive steps).

Article. Your article will include an introduction, literature review, data and methods, results, and conclusion, all written in journal format. Your introduction will provide a short substantive description of your theoretical argument and your research questions (typically about 2 pages). Your literature review will discuss any relevant theoretical literature as well as prior empirical research on this issue, and identify your main hypotheses (typically, this section should not exceed 8 pages). Your data and methods section will describe the dataset, variables, and your analytic methodology. Make sure to include a discussion of diagnostics and variable modifications in this section. Also, include a table with descriptive statistics for your sample. Next, your results section will discuss your findings. Please include tables (in journal format) and graphs assisting in the interpretation of results. Finally, please include a conclusion summarizing your findings, linking them to prior literature and to theory, and addressing study limitations and main contributions.

The letter grades for the course will be determined as follows:

93-100	A
90-92	A-
87-89	B+
83-86	B
80-82	B-
60-79	C
0-59	F

COURSE OUTLINE.

January 19: Introduction to Hierarchical Linear Modeling (HLM) and Stata

January 26: Two-Level HLM Models
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. Chapters 1, 2 from *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.

February 2: HLM Model Building Strategies
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. Chapters 3 and 4 from *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.

February 9: HLM Assumptions, Diagnostics, and Remedies
Snijders, Tom A. B., and Roel J. Bosker. 2011. Chapter 10 from *Multilevel Analysis: An Introduction to Basic and Advanced Multilevel Modeling, 2nd edition.* Thousand Oaks, CA: Sage.

February 16: HLM Assumptions, Diagnostics, and Remedies
Proposal due*
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. Chapter 13 from *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.

February 23: Missing Data in HLM
Taris, Toon W. 2000. Chapter 2 from: *A Primer in Longitudinal Data Analysis.* Thousand Oaks, CA: Sage Publications.
Acock, Alan C. 2005. Working with Missing Values. *Journal of Marriage and* Family 67: 1012–1028.

March 2: Missing Data in HLM, Part 2
Grund, Simon, Oliver Lüdtke, Alexander Robitzsch. 2018. "Multiple Imputation of Missing Data for Multilevel Models: Simulations and Recommendations." *Organizational Research Methods*, 21, 111-49.
Lüdtke, O., Robitzsch, A., & Grund, S. (2017). "Multiple Imputation of Missing Data in Multilevel Designs: A Comparison of Different Strategies." *Psychological Methods*, 22(1), 141–165

March 9: Spring Break

March 16: Reading HLM Article
Huffman, Matt L. 2004. "More Pay, More Inequality? The Influence of Average Wage Levels and the Racial Composition of Jobs on the Black–White Wage Gap." *Social Science Research*, 33, 498–520.

March 23: Longitudinal Data Analysis using HLM
Data Analysis draft due for peer review *
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. Chapters 5 and 16 from *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.

March 30: Longitudinal Data Analysis using HLM
Peer feedback due *
Singer, Judith D., & John B. Willett. 2003. Chapters 7 and 8 from *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence.* New York: Oxford University Press.
Baldwin, Scott A., and John P. Hoffmann. 2002. "The Dynamics of Self-Esteem: A Growth-Curve Analysis." *Journal of Youth and Adolescence, 31*, 2, 101–113.

April 6: Three-Level Models
Raudenbush, Stephen and Anthony Bryk. 2002. Chapter 8 from *Hierarchical Linear Models: Applications and Data Analysis Methods. 3rd edition*. Newbury Park, CA: Sage.
Johnson, Brian D. 2006. "The Multilevel Context of Criminal Sentencing: Integrating Judge- and County-Level Influences." *Criminology* 44: 259-298.

April 13: HLM Models for Categorical and Count Data
Revised analysis draft and article first draft due for peer review
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. Chapter 6 and 7 from *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.
Litwin, Kenneth J. 2004. "A Multilevel Multivariate Analysis of Factors Affecting Homicide Clearances." *Journal of Research in Crime and Delinquency*, 41, 327-351.

April 20: Models for Dyadic Data
***Peer feedback due ***
Kenny, David A., Deborah A. Kashy, and William L. Cook. 2006. Chapters 4 and 7 from *Dyadic Data Analysi*s. New York: Guilford Press.
Widman, Laura, Deborah P. Welsh, James K. McNulty, and Katherine C. Little. 2006. "Sexual Communication and Contraceptive Use in Adolescent Dating Couples." *Journal of Adolescent Health* 39: 893-899

April 27: Cross-Nested Models
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. Chapter 9 from *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.
Wheaton, Blaire, and Philippa Clarke. 2003. "Space Meets Time: Integrating Temporal and Contextual Influences on Mental Health in Early Adulthood." *American Sociological Review* 68: 680-706.

May 4: Sample Size and Power Analysis for HLM
Data Analysis and Article final drafts due
Hox, Joop, Mirjam Moerbeek, and Rens van de Schoot. 2017. Chapter 12 from *Multilevel Analysis: Techniques and Applications. 3rd edition.* Routledge.

May 11: No class.
Please make individual appointments for this week to discuss your final project