PSYC 621 Seminar in Quantitative Psychology (Multilevel Modeling)

Units: 4
Term—Day—Time: Spring 2019—Tues & Thurs—10:00–11:50 am

Location: GFS 113

Instructor: Hok Chio (Mark) Lai
Office: SGM 621
Office Hours: Thurs 12:00–1:00 pm, and by appointment
Contact Info: Email: hokchiol@usc.edu; phone number (office): (213) 740-0538. Timeline for replying to emails/calls: within 48 hours.

Course Description

This is a graduate-level class in statistical methods on multilevel modeling, a popular technique in behavioral and social science research. The course covers topics in multilevel modeling including two- and three-level hierarchical linear models (HLM), random intercepts and slopes, longitudinal models and growth curve models, as well as some recent development in multilevel modeling.

The course begins with a brief overview of the ubiquity of multilevel data and the problems of using conventional methods to handle such data and then transitions to the conceptual and statistical foundations of two-level multilevel models. Students will be exposed to real data examples and are required to perform analyses using real data of their own or that the instructor provides. Later material covers the use of multilevel modeling as a general framework for longitudinal data analysis, and other modeling considerations such as categorical data, three-level and non-hierarchical (e.g., cross-classified) data structure, multivariate models, and study designs. Students are also encouraged to provide input in suggesting topics to be covered for this course.

Learning Objectives and Outcomes

After the successful completion of this course, students will be able to . . .
1. Articulate the problems of analyzing clustered data with multiple regression/ANOVA;
2. Distinguish between different multilevel data structures;
3. Describe the statistical and conceptual foundations of multilevel modeling;
4. Independently perform multilevel analyses covered in this class using statistical software on real data;
5. Conduct a research project involving multilevel modeling, and effectively communicate their findings/products in an oral presentation as well as in a written report.

Prerequisite(s): PSYC 503: Regression and the General Linear Model (or a similar regression class)
Co-Requisite(s): None
Concurrent Enrollment: None
Recommended Preparation: Experience with statistical software (preferably R)

Course Notes

For class sessions, students are expected to finish the reading assignments before class and actively participate in class discussions and activities. A typical class meeting will include lectures and small-group

discussions/activities. This class also includes lab sessions for software demonstrations and for students to work on assignments. Lecture slides/notes will be posted on Blackboard before class meetings, but please note that the lecture slides only serve to guide class discussions and cannot replace the assigned readings. Students are expected to bring their own laptop to class to follow the software demonstration and work on assignments during lab sessions.

Technological Proficiency and Hardware/Software Required
You will need to use R (or other statistical software upon approval from the instructor) to complete the assignments and project.

Required Readings and Supplementary Materials
Required:
- Hox, J. J., Moerbeek, M., & van de Schoot, R. (2018). *Multilevel analysis: Techniques and Applications* (3rd ed.). New York, NY: Routledge.
- Other required readings will be posted on Blackboard

Supplementary
- Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: applications and data analysis methods (2nd ed.). Thousand Oaks, CA: Sage.
- Snijders, T. A. B., & Bosker, R. J. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling* (2nd ed.). Thousand Oaks, CA: Sage.
- Gelman, A., & Hill, J. (2006). *Data analysis using regression and multilevel/hierarchical models*. Cambridge, UK: Cambridge University Press.
- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford, UK: Oxford University Press. [For longitudinal data analysis]
- West B. T., Welch, K. B., & Gałecki, A. T. (2014). *Linear mixed models: A practical guide using statistical software* (2nd ed.). Boca Raton, FL: CRC. [For reference of using different software]
- Heck, R. H., Thomas, S. L., & Tabata, L. N. (2014). *Multilevel and longitudinal modeling with IBM SPSS (2nd ed.)*. New York, NY: Routledge. [For reference of SPSS users]

Description and Assessment of Assignments
0. Participation (0%). Students are expected to come to class and lab sessions, actively participate in class discussions and activities.
1. Homework assignments (60%). There will be seven assignments for you to apply the concepts and techniques discussed in class to analytic problems. The first assignment asks you to search and review an article using multilevel modeling, whereas subsequent assignments typically involve performing data analyses using data sets of your own or provided by the instructor, and interpreting the results with some guided questions. Detailed instruction for each assignment will be provided on Blackboard at least a week before the assignment due date. Your must submit your work electronically to Blackboard by 10:00 a.m. Pacific time on the assigned due date (i.e., before the Thursday class starts). Late assignments will not be accepted without prior approval by the instructor.
2. Final project (40%; 5% prospectus, 15% presentation, 20% final paper). You will complete a research project related to multilevel modeling, typically a research report of an empirical study using real data or a theoretical/methodological paper about certain aspects of multilevel modeling. Students interested in project ideas other than an empirical research report (e.g., software package development, systematic review/meta-analysis) are encouraged to discuss their ideas with the instructor.

   Each of you can choose to work by yourself or work with a partner. Each student/group should schedule to meet with the instructor to talk about their project during week 9 (March 4–8).

   There are three grading components for your final project:

Prospectus (5%)
A prospectus about your project should be submitted by Thursday, February 28, 2019. The prospectus should contain a concise description of what you (or your group) plan to do for your project, including a preliminary plan for statistical analysis. The prospectus should be limited to 1 single-spaced page (excluding references).

Project Presentation (15%)
During the last three class meetings (4/23, 4/25, and 4/30), each group will give a 15-minute presentation (including Q&A) on their project. The final presentation should include the following four sections: introduction, method, results, and discussion, or something comparable for methodological or theoretical work. A grading rubric on the research presentation will be posted on Blackboard.

Final Paper (20%)
The final paper for each group will be due Tuesday, May 7, 2019, at 10:00 a.m. Pacific Time (which is the assigned exam time for the class). Your final paper should incorporate feedback received from the instructor and peers regarding your project presentation. The final paper should include four sections: introduction, method, results, and discussion, or comparable sections. The final paper should be 8-15 double-spaced pages of text (i.e., excluding title page, abstract, references, tables, figures, and appendices).

Grading Breakdown

Assignment	Points	% of Grade
Participation	0	0
Homework 1-7	700	60
Prospectus	100	5
Presentation	100	15
Final paper	100	20
TOTAL	1,000	100

Grading Scale
Course final grades will be determined using the following scale

A	93-100		B-	77-80
A-	89-92		C+	73-76
B+	85-88		C	70-72
B	81-84		C-	Below 70 (failing)

Assignment Submission Policy
The assignments should be submitted through Blackboard by Thursday at 10:00 a.m. Pacific time, before the class starts.

Grading Timeline
Generally, all graded work will be returned no later than two weeks from the submission deadline.

Late work

In general, late work will not be accepted. In rare, exceptional circumstances (where appropriate documentation is provided within 7 days), the assignments may be accepted late at the sole discretion of the instructor. Please obtain prior, written consent if possible.

Technology in the classroom

Phones
Your phone should be turned off or in silent mode (not on vibrate), and should not be used in the classroom.

Tablets and Laptops
During lecture time in the classroom, students can use tablets and laptops only for purposes of viewing course materials and taking notes. Use of tablets and laptops for note taking is strongly discouraged as recent research (Mueller & Oppenheimer, 2014) has shown that note-taking by handwriting is better than typing for improving conceptual learning, and use of such devices may distract both yourself and your peers (Sana, Weston, & Cepeda, 2013). During lab sessions, students should use their laptops to follow the software demonstration and work on assignments during lab sessions.

Attendance
Students are expected to attend all class and lab sessions on time.

(Tentative) Course Schedule: A Weekly Breakdown

	Topics/Daily Activities	Readings and Homework	Deliverable/ Due Dates
Week 1 1/8 & 1/10	- Overview of Multilevel Models - Review of multiple regression - R Markdown	HMV Ch 1, 2.4 R Markdown Introduction Markdown Quick Reference R Markdown Cheat Sheet	HW 1/ Jan 17
Week 2 1/15 & 1/17	- Random Intercept Model - Means-As-Outcomes Model	HMV 2.1, 2.2	
Week 3 1/22 & 1/24	- Centering - Random Slopes - Cross-Level Interactions	HMV 2.2, 4.3 Snijders & Bosker 5.1-5.3 Enders & Tofighi (2007)	HW 2/ Jan 31
Week 4 1/29 & 1/31	- Effect Size - Assumptions	HMV 4.4, & Ch 13 Johnson (2014)	
Week 5 2/5 & 2/7	- Model Estimation - Model Comparison - Bayesian Methods	HMV Ch 3	HW 3/ Feb 14
Week 6 2/12 & 2/14	Multilevel Models for Experimental Designs	Supplemental Readings	HW 4/ Feb 21
Week 7 2/19 & 2/21	Analyzing Longitudinal Data I	HMV 5.1-5.3 Singer & Willet Ch 2	Prospectus/ Feb 28
Week 8 2/26 & 2/28	Analyzing Longitudinal Data II	HMV 5.4-5.8	HW 5/ Mar 7
Week 9 3/5 & 3/7	Individual meeting on the final research project		
	Spring Break		
Week 10 3/19 & 3/23	- Model Building Strategies - Exploratory analyses	HMV 4.1 Supplemental Reading	
Week 11 3/26 & 3/28	- Multilevel Logistic Regression - Multilevel Categorical Models	HMV Ch 6 & 7	HW 6/ Mar 28
Week 12 4/2 & 4/4	- Sample Size - Power (Precision) Analysis	HMV 12.1-12.4 & 12.6	HW 7/ Apr 4
Week 13 4/9 & 4/11	- Three-Level Models - Cross-Classified Models	HMV 2.3 & Ch 9	
Week 14 4/16 & 4/18	- Multilevel Mediation - Multilevel Path Analysis	HMV 4.5 & Ch 15	
Week 15 4/23 & 4/25	- Reporting Results - Final Presentation I	Ferron et al. (2008) HMV Appendix A	
Week 16 4/30	Final Presentation II		
FINAL	**May 7, 10 am** **Final paper due**		

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, "Behavior Violating University Standards" policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Student Health Counseling Services - (213) 740-7711 – 24/7 on call
engemannshc.usc.edu/counseling
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org
Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 – 24/7 on call
engemannshc.usc.edu/rsvp
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) | Title IX - (213) 740-5086
equity.usc.edu, titleix.usc.edu
Information about how to get help or help a survivor of harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants. The university prohibits discrimination or harassment based on the following protected characteristics: race, color, national origin, ancestry, religion, sex, gender, gender identity, gender expression, sexual orientation, age, physical disability, medical condition, mental disability, marital status, pregnancy, veteran status, genetic information, and any other characteristic which may be specified in applicable laws and governmental regulations.

Bias Assessment Response and Support - (213) 740-2421
studentaffairs.usc.edu/bias-assessment-response-support
Avenue to report incidents of bias, hate crimes, and microaggressions for appropriate investigation and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu
Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Support and Advocacy - (213) 821-4710
studentaffairs.usc.edu/ssa
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101
diversity.usc.edu
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
dps.usc.edu, emergency.usc.edu
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call
dps.usc.edu
Non-emergency assistance or information.