Psychology 6313
Spring 2023

Multilevel Modeling

Instructor: Osvaldo F. Morera, PhD
Office: Room 212, Psychology Building
Phone   747-5417
Office hrs: Tuesdays and Thursdays from 9:00 am to 10:00 am
Email: omorera@utep.edu
Lectures: 10:30 am – 11:50 am, Room 105
Teaching assistant: Elena Vaudreuil (evaudreuil@miners.utep.edu)

Texts:

Snijders, T. & Bosker, R. (2012). *Multilevel analysis: An introduction to basic and advanced multilevel modeling*, 2nd Edition. Thousand Oaks, CA: Sage.

Heck, R. H., Thomas, S.L. & Tabata, L.N. (2014). *Multilevel and Longitudinal Modeling with IBM SPSS (2nd edition)*. New York: Routledge.

Selected chapters from Neter, Wasserman & Kutner on fixed effects ANOVA (Model I), Random effects ANOVA (Model II), and mixed effects ANOVA (Model III).

Other Readings (for now)

Centering in MLM

Enders, C.K., & Tofighi, D. (2007). Centering predictor variables in cross-sectional multilevel models: A new look at an old issue. *Psychological Methods, 12*, 121-138.

Lüdtke, O., Marsh, H.W., Robitzsch, A., Trautwein, U., Asparouhov, T., & Muthén, B. (2008). The multilevel latent covariate model: A new more reliable approach to group level effects in contextual studies. *Psychological Methods, 13*, 203-229.

Repeated Measures as MLM Models

Gueorguieva, R. & Krystal, J.H. (2004). Move Over ANOVA: Progress in Analyzing Repeated Measures Data and its Reflection in Papers Published in the Archives of General Psychiatry. *Archives of General Psychiatry, 61*, 310-217.

Hoffman, L., & Rovine, M.J. (2007). Multilevel models for the experimental psychologist: Foundations and illustrative examples. *Behavior Research Methods, 39*, 101-117.

Locker Jr., L., Hoffman, L., & Bovaird, J. A. (2007). On the use of multilevel modeling in the analysis of psycholinguistic data. *Behavior Research Methods, 39*, 723-730.

Multilevel Mediation

Preacher, K.J., Zyphur, M.J., Zhang, Z. (2010). A general multilevel model SEM framework for assessing multilevel mediation. *Psychological Methods, 15*, 209-223.

Prerequisites:

I assume that you have knowledge of Psychology 6307 (and Psychology 6308) prior to taking this course. I will review the one-way fixed effects ANOVA model prior to getting into the one-way random effects ANOVA and models where one factor is fixed and the other factor is random. If you have not had Psychology 6308, I will review what you may have missed. Time permitting, I may also talk about multilevel mediation and that may require some knowledge of latent variable modeling, but Psych 6302 or 6323 is not a prerequisite for the class.

Course objectives/Learning Objectives:

Data in the social and applied sciences are often "nested" or "clustered" or have a multilevel structure. For example, jurors are nested within juries; patients are nested within doctors; students are nested within classroom (which are then nested in schools, which are nested in school districts, which are nested in counties that are nested in states). Measurements of attributes or characteristics of juries (time to deliberate) and jurors (age, sex, individual difference measures like legal authoritarianism) may also be available. Repeated measures data and longitudinal data are also multilevel data, as they are nested within person.

Most standard statistical models assume the independence of observations (or independence of errors). When data have a multilevel structure, observations are typically correlated. In other words, the standard independence assumption is violated and our statistical testing procedure becomes very liberal. For example, jurors make decisions after lengthy deliberations. Undoubtedly, juror verdicts are influenced by other jurors.

This course provides an introduction to the use of multilevel models that takes into account dependencies between observations. You will learn the basic ideas of multilevel modeling and you have a chance to apply these techniques to data that your group has for a class project (as well as data that I will ask you to analyze on homework assignments).

Topics that will be covered include knowing the difference between fixed effects and random effects ANOVA models. An introduction to multilevel analyses, random intercept and slope models, 2 level models, centering, hypothesis testing, power analysis through Monte Carlo simulations, model assessment, power analysis for designing multilevel studies, probing interactions and longitudinal (repeated measures) data and 3 level models will also be discussed. Time permitting, I will talk about cross-classified data,

models for dichotomous responses, and the assessment of mediation in multilevel modeling and power analysis. At the minimum, you will have a solid understanding of multilevel modeling and we should get through what Snijders & Bosker (2012) would consider sufficient for an introductory course (Chapters 1-6 and 7.1).

covid19 Statement:

Each person will be able to make their own decision concerning the use of a mask in class and in office hours. I ask that everyone's decisions be respected. If you have covid, you must report it at covidaction@utep.edu.

Computing:

We will primarily be using SPSS and M*plus*. These software packages are available in Room105.   I will email times when the computers in Room 105 are accessible.

A separate handout also provides you with information on remotely accessing a computer in Room 212, which is my office.   I would still encourage you to first use the computers in Room 105 at the available times, as the computer in my office may be accidentally turned off and I may not be able to come to campus to turn it on. In addition, I often like to use that computer and I anticipate writing at least one grant proposal this semester.   You may not be able to access that computer when I am using it.

Evaluation:

Students will be evaluated on the basis on individual homework assignments (25% of the grade), at least one in class quiz (15% of grade), class attendance (15% of the grade), group presentation (15% of the grade) and a group class paper written in APA format (30% of the grade).

Policy on Auditors

Student and faculty auditors are welcome in the class, as long as they complete the required university audit form. However, my first priority is to the students who are registered for the class. I also ask that auditors not submit any homework assignments or take any exams, as it is extra work on my part and the TA's part. If your attendance becomes sporadic, I expect that you will not slow down the class questions that were covered in prior lectures. If your attendance requires additional time of my TA, additional time of myself or takes away from the learning experience from the registered students in the class, you should not audit this class.

Course structure and requirements:

1.   Students will be responsible for all material covered in lectures, class handouts and assigned readings.   With regard to lectures, there is no such thing a stupid

question (in most cases). If you have a question, someone else probably has that same question. Feel free to ask any questions.

2.   A calculator is still highly recommended. It should perform all basic mathematical operations and should have several memories.

3.   Quiz(zes) are closed books and closed notes. However, you will be allowed to use 2 crib sheets (see accompanying handout). As you can bring in crib sheets to the exam, examinations truly designed to test your knowledge of the content area. While the exams are designed to be completed in the allotted time, you will have extra time to complete the final exam (if necessary). You can bring 2 crib sheets to the quiz(zes).

4.   Make-up exams will be given only under extraordinary circumstances, such as documented sickness, hospitalization or death of a family member (funeral card required). In some other cases, exceptions will be made if **advance notice of absence** is provided. *Note*: Leaving town to start your spring break early or your summer vacation early is not acceptable excuse to move your examination up, as it will rush me in making the examination

5.   There will between 4 - 8 homework assignments (probably 5, we'll see).   Many of the homework assignments will require the use of statistical software. We will use SPSS and MPlus in this class. Homework assignments can be submitted to the TA (Elena) in Blackboard. If you have issues in submitting a homework assignment via Blackboard, send Elena and I an email before the homework assignment is due. Elena will create a folder in Blackboard where he will create submission links/portals for the submission of each homework assignment.

6.   Please turn off all pagers, beepers and other electronic devices before entering class. They are a distraction to other students in the class and to the professor.

7.   Office Hours and Appointments: If you have questions concerning the topics of this course, you can stop by to see me during my office hours or please do not hesitate to make an appointment to see me. If you stop by my office and you do not have an appointment to see me, I will ask you to schedule an appointment to see me and I will answer your question during that appointed time. This policy also applies to "questions that will only take a minute to answer."

8.   Conduct of Graduate Students: Students enrolled in this course are graduate students and I have certain expectations of graduate students. As you are pursuing an advanced professional degree, I expect that you will act in a professional manner. Asking for extensions on assignments because you are busy with other courses/projects/papers is not professional.   In addition, I also expect that you will show respect to everyone in the class.

9.   Academic Misconduct: The Department of Psychology follows the university policy on academic honesty that is published in the Undergraduate College-Academic Regulations and is available to all members of the University community. Additional information on academic misconduct can also be found at the following links:

This policy represents a core value of the University and all members of the university community are responsible for abiding by its tenets. Lack of knowledge of this policy is not an acceptable defense to any charge of academic dishonesty. The University has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their own work, for the appropriate citation of sources and for respect of others' academic endeavors.

In other words, plagiarism, cheating and academic dishonesty will not be tolerated in this class. Plagiarism consists of using another person's ideas, words, or assistance, while failing to acknowledge this person. If you must submit someone else's work as if it were you own, you must acknowledge the original author/original source. If I suspect any incidence of academic dishonesty, plagiarism, collusion, cheating, etc. on any class assignment or exam, I will forward the material to the Office of Student Conflict and Conflict Resolution.

10.   Group work: There will be an emphasis on group work in this class. For example, the class project is group-based. Academic dishonesty on a group assignment may jeopardize the entire group, even if the group is unaware of your actions. If an entire group turns in an assignment and one or more members does not meaningfully contribute to that assignment, I reserve the right to assign non-contributing group members a score that reflects their contribution to the assignment.

11. Accommodations for Students with Disabilities: If you have an identified disability that may affect your performance in this class, please see the instructor (no later than the end of the first class) or contact the Center for Accommodation and Student Services in Room 106 of the Student Union (phone 747-5148) such that provisions can be made to ensure that you have an equal opportunity to meet all the requirements of this course.

12. Attendance: Everyone is expected to attend class online. The TA (Elena) will keep attendance for every class. Please keep your camera on while in class, as we will assume that you are not in attendance if you turn off your camera. If your camera is off, Elena will send you a private message through the chat – asking you to turn on your camera. If the camera is not on after that message, you will be counted as absent.

Important Dates to Remember

Wednesday, February 1	Census Day; Last day to drop course without "W" appearing on transcript
Tuesday, February 7	Fixed effects/random effects ANOVA quiz

Tuesday, February 21	Initial Project Proposal write-up due
March 13 – March 17	Spring break
Thursday, March 30	Course drop deadline
Friday, March 31	Cesar Chavez Day (no classes at UTEP)
Friday, April 7	Spring Reading Day (no classes at UTEP)
Thursday, May 4	Last Day of our class
Friday, May 5	Class projects due
Wednesday, May 17	Grades due to Records Office

Brief description of each major course requirement, including each major assignment and examinations.

This is a tentative list, as it based on progress that we make as a class. Topics on homework assignments may be moved to the preceding or following homework assignment. Topics may also be added.

Homework 1: Model I, Model II, Model III ANOVA. I may also add a problem about coding categorical research factors.

Homework 2: Matrix algebra and thinking about multilevel applications in your research. If I do not add a problem about coding categorical research factors in the prior homework assignment, I may do so in this assignment

Homework 3: MLM problem

Quiz 1: Material from Homeworks 1 – 3 to be covered, although I may restrict it to just Model I, Model II and Model III ANOVA and the coding of categorical research factors

Homework 4: Initial project write-up will be counted as a homework assignment

Homework 5: Power analysis

Homework 6: Longitudinal or repeated measures problem

Group Class presentation: The class presentation will allow your group to incorporate feedback from the class to aid submission of the final paper

Final paper: Data from your lab or data that you find will be written up as a paper that could be submitted for publication after the class has ended.

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Tentative Course Schedule

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Date	Topic	Reading
1/17, 1/19	Fixed and random effects ANOVA, matrix algebra	NWK chptrs.
1/24	Review of OLS regression	Class notes
1/26, 1/31	Intro to multilevel modeling and empty model	Chapters 1-3
2/2 – 2/14	Random intercept model, random slope model Exploring variability	Chapter 4, 7
2/7	**Fixed and random effects ANOVA/ categorical data coding in class quiz**	
2/16 - 2/23	Centering in MLM and power analysis	Chapter 5

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INITIAL PROJECT PROPOSAL, DUE 2/21

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Date	Topic	Reading
2/28	Estimation methods	Chp. 4, 5, 10
3/2 – 3/9	Inference for fixed effects, random effects, model evaluation and testing model assumptions Probing interactions in multilevel models	Chapters 6,9
3/14 - 3/16	**SPRING BREAK**	
3/21 – 3/23	Longitudinal models	Chapter 15
3/28 – 4/4	Repeated measures	Chapter 15 and Hoffman papers
4/6 - 4/11	3 level models	Chapter 5, 11
4/13 - 4/20	Cross-classified models, multivariate multilevel models and multilevel logistic regression	Chp 16, 17
4/25 – 4/27	Group presentations	
5/2 - 5/	Multilevel mediation, multilevel SEM	Preacher papers

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FINAL PROJECT DUE, MAY 5 at 12 PM

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