

Spring 2014 Psychology 945: Advanced Multilevel Models

Instructor:	Dr. Lesa Hoffman	Materials:	http://psych.unl.edu/psycrs/945/index.html
Email:	Lesam@unl.edu	Homework:	http://psych.unl.edu/psycrs/945hw/index.asp
Rooms:	77 and 234 Burnett Hall	Office:	219 Burnett Hall
Time:	9:00–11:50 Wednesdays	Office Hours:	1:30–3:30 MW

Schedule of Topics and Events:

The online syllabus at the web address provided above will always have the most current information.

Course Objectives, Materials, and Pre-Requisites:

This course will feature the advanced uses of the multilevel models (*aka* mixed models, hierarchical linear models) for complex data analysis. After reviewing two-level longitudinal models, the course will cover multiple extensions, including models for accelerated time, cross-classification, multivariate outcomes, three-level outcomes, and generalized outcomes. Class time will be devoted primarily to lectures and examples. Lecture materials in .pdf format will be available electronically at the course website above prior to each class. Audio/Video recordings of the class lectures in .mp4 format will also be posted online, but are not intended to take the place of class attendance. In addition to the primary textbook (see below), supplemental book chapters and journal articles will be assigned for each topic; the list of readings below will be updated as needed. All readings will be available electronically within the online homework portal.

Because the course will have an applied focus using SAS and *Mplus* software, portions of the class and instructor office hours will be held in the 234 Burnett computer lab to provide opportunities for in-class practice and to work on homework assignments and receive immediate assistance. Participants will need access to SAS and *Mplus* software, both of which are available in rooms 234, 227, and 230 Burnett and online through the Tusker computing cluster (see the course webpage for access instructions). Finally, participants should be familiar with the general linear models and multivariate modeling using maximum likelihood (as covered in PSYC 941, 942, and 943 or the equivalent) prior to enrolling in this course. This course is intended to have PSYC 944 (or equivalent) as a pre-requisite as well.

Academic Honesty:

As a reminder, the University has a policy on academic honesty (see the Graduate Studies Bulletin for further details). All course assignments should be done individually.

Accommodating Students with Disabilities:

Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of UNL to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Services for Students with Disabilities (SSD) office, 132 Canfield Administration, 472-3787 voice or TTY.

Course Requirements:

Course performance will be evaluated using 5 homework assignments designed to give participants hands-on practice applying the techniques discussed in class and will be due as listed on the online syllabus. Assignments will include data analysis, results interpretations, and other questions. Successfully running SAS software through the HCC will also be required (worth 4 homework points). In addition, "Homework 0" will be worth 3 bonus points to familiarize participants with the online homework system.

Homework assignments will feature common data and have two parts. The computational portion of the homework assignments will be administered and submitted using the online homework portal above. The written results sections that accompany them will be submitted through UNL Blackboard and returned using the online homework portal. Written assignments must be at **least 3/4 complete in order to be accepted and may be revised ONCE to earn the maximum points** (due by the end of semester, submitted via Blackboard). Assignments should be submitted as a Microsoft Word document using this

naming convention: **945HW#_Firstname_Lastname** (adding an "r" to the end of the # for a revision). Please use the track changes function in Microsoft Word and leave in all previous instructor comments when revising assignments.

In addition, participants will be responsible for presenting **an original individual data analysis** to the class using at least one of the advanced models presented during semester. Details are forthcoming. The homework assignments will be worth 80 points, and the individual data analysis will be worth 20 points.

Policy on Late Homework Assignments and Incompletes:

In order to be able to provide the entire class with prompt feedback, **late homework assignments will incur a 3-point penalty**. However, extensions will be granted as needed for extenuating circumstances (e.g., conferences, family obligations) if requested **at least three weeks in advance of the due date**. Finally, a grade of "incomplete" will only be given in the event of extremely dire circumstances.

Final grades will be determined by number of points earned out of 100 possible:

≥97 = A+ 93-96 = A 90-92 = A- 87-89 = B+ 83-86 = B 80-82 = B- < 80 = C or no pass

Primary Course Text:

Hoffman, L. (forthcoming). *Longitudinal analysis: Modeling within-person fluctuation and change*. NY, NY: Routledge Academic.

Supplementary Readings:

Bauer, D. J. (2003). Estimating multilevel linear models as structural equation models. *Journal of Educational and Behavioral Statistics*, 28(2), 135-167.

Bauer, D. J. (2009). A note on comparing the estimates of models for cluster-correlated or longitudinal data with binary or ordinal outcomes. *Psychometrika*, 74, 97-105.

Curran, P. J., Lee, T., Howard, A. L., Lane, S., & MacCallum, R. C. (2012). Disaggregating within-person and between-person effects in multilevel and structural equation growth models. In G. Hancock & J. Harring (Eds.), *Advances in Longitudinal Methods in the Social and Behavioral Sciences* (pp. XX-XX). Charlotte, NC: Information Age Publishing

Hedeker, D., & Mermelstein, R. J. (2012). Mood changes associated with smoking in adolescents: An application of a mixed-effects location scale model for longitudinal ecological momentary assessment (EMA) data. In G. Hancock & J. Harring (Eds.), *Advances in Longitudinal Methods in the Social and Behavioral Sciences* (pp. 59-79). Charlotte, NC: Information Age Publishing.

Hoffman, L. (2012). Considering alternative metrics of time: Does anybody really know what "time" is? In J. Harring & G. Hancock (Eds.), *Advances in Longitudinal Methods in the Social and Behavioral Sciences* (pp. 255-287). Charlotte, NC: Information Age Publishing.

Hox, J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed). NY, NY: Routledge Academic.

Hur, K., Hedeker, D., Henderson, W., Khuri, S., & Daley, S. (2003). Modeling clustered count data with excess zeros in health care outcomes research. *Health Services and Outcomes Research Methodology*, 3, 5-20.

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(3), 203-229.

Preacher, K. J., Zhang, Z., & Zyphur, M. J. (2011). Alternative methods for assessing mediation in multilevel data: The advantages of multilevel SEM. *Structural Equation Modeling*, 18, 161-182.

Preacher, K. J., Zyphur, M. J., & Zhang, Z. (2010). A general multilevel SEM framework for assessing multilevel mediation. *Psychological Methods*, 15(3), 209-233.

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

Tentative Schedule of Events:

Week	Date	Topics	Readings
1	1/15	Course Introduction Lecture 1: Review of MLM for Longitudinal Data Example 1: Unconditional Models of Change	Hoffman ch. 1-7
	1/17	HW0 due by 11:59 PM	
2	1/22	NO CLASS (or office hours)	
3	1/28	HW1 effort draft due by 11:59 PM	
	1/29	In-Class Q & A Lecture 2: Time-Varying Predictors for Within-Person Fluctuation Example 2: Predicting Within-Person Fluctuation and Heterogeneity	Hoffman ch. 8 Hedeker & Mermelstein (2012)
	1/31	By now you will need to have successfully registered for Tusker and submitted SAS and Mplus scripts for analysis (3 HW points).	
4	2/5	Lecture 2 and Example 2, continued Lecture 3: Accelerated Longitudinal Models Example 3: Models of Accelerated Time	Hoffman ch. 10 Sections 1-2 Hoffman (2012)
	2/7	HW1 accuracy draft due by 11:59 PM	
5	2/12	Lecture 4: Review of Multilevel Models for Clustered Data Example 4: Two-Level Models for Persons in Groups Lecture 5: Multivariate Longitudinal Models in SAS and Mplus Example 5a: Multivariate Within-Person Fluctuation Example 5b: Multivariate Within-Person Change	Raudenbush & Bryk (2002) ch. 5
	2/14	HW2 due by 11:59 PM	
6	2/19	234 Lab for Multivariate Longitudinal Models in Mplus Example 5b, continued Example 5c: Multivariate Within-Family Change Example 5d: Mediation of Within-Person Fluctuation	Hoffman ch. 9 Curran et al. (2012)
7	2/26	234 Lab for Multivariate Longitudinal Models as SEM in Mplus Example 5b and 5d, continued Example 5e: Mediation of Within-Person Change Example 5f: Longitudinal Difference Score Models	Bauer (2003) Lüdtke et al. (2008) Preacher et al. (2010; 2011)
	2/28	HW3 due by 11:59 PM	
8	3/5	Lecture 5: Three-Level Models Example 5a: Analysis of Measurement Burst Designs Example 5b: Clustered Longitudinal Models	Hoffman ch. 10 Sections 3-6 Hoffman ch. 11 Sections 1-2
9	3/12	Lecture 6: Generalized Multilevel Models Example 6a: Clustered Models with Binary Outcomes	Bauer (2009) Hox (2010) ch. 6-8
	3/14	HW4 due by 11:59 PM	
10	3/19	NO CLASS (or office hours)	
11	3/26	NO CLASS (or office hours)	
12	4/2	Example 6b: Longitudinal Models with Ordinal Outcomes Example 6c: Longitudinal Models with Other Non-Normal Outcomes	Hur et al. (2003)
	4/4	HW5 due by 11:59 PM	

13	4/9	Lecture 7: Crossed Random Effects Models Example 7a: Crossed Subjects and Items Example 7b: Cross-Classified Models for Clustered Data Example 7c: Changing Groups over Time	Hoffman ch. 11 Section 3-6 Hoffman ch. 12
14	4/16	Review	Hoffman ch. 13
15	4/23	Student Presentations	
16	4/30	Student Presentations	
17	5/5	All homework revisions due by 11:59 PM	
