

Psychological and Quantitative Foundations (PSQF) 7375 Spring 2019: Longitudinal Multilevel Models

Instructor: Professor Lesa Hoffman (*she, her, hers*)
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Course Room: North 166 Lindquist Center

Course Time: Tuesdays and Thursdays 12:30–1:45 PM

Office Hours: Tuesdays and Thursdays 1:45–3:00 PM in N166 LC

Schedule of Topics and Events:

The planned schedule of topics and events may need to be adjusted throughout the course. The online syllabus at the web address below will always have the most current schedule and course materials: http://www.lesahoffman.com/PSQF7375_Longitudinal/index.html

Course Objectives, Materials, and Pre-Requisites:

This course will illustrate the uses of multilevel models (i.e., general linear mixed-effect models, hierarchical linear models) for the analysis of longitudinal (and other repeated measures) data. The course is organized to take participants through each of the cumulative steps in a longitudinal analysis involving time-invariant predictors: deciding which type of model is appropriate, organizing the data and coding predictor variables, evaluating fixed and random effects and/or alternative covariance structures, predicting multiple sources of variation, and interpreting and presenting empirical findings. Class time will be devoted primarily to lectures and examples. Lecture materials will be available for download at the website above the day prior to class, or else paper copies can be requested. Video recordings of the class lectures will also be available online, but are not intended to take the place of class attendance. Selected book chapters and journal articles will be assigned for each specific topic as needed; the initial list of readings below may be updated. There will be no exams nor any required attendance outside class. However, because the course will have an applied focus requiring statistical software, instructor office hours will also be held in a group-based format, in which multiple participants will have (optional) opportunities to work on course assignments and receive immediate assistance in turn. Participants should be comfortable with estimating and interpreting general linear models (i.e., analysis of variance, regression) prior to enrolling in this course.

Course Requirements:

Participants will have the opportunity to earn **up to 100 total points** in this course. Up to **88 points** can be earned from **homework assignments** (approximately 8 in total). Up to **12 points** may be earned from submitting **outside-of-class quizzes** (approximately 6 in total). Please note there will also be an opportunity to earn up to **3 points of extra credit** (labeled as homework 0; see the online syllabus for more information). There may be other opportunities to earn extra credit at the instructor's discretion.

Policy on Late Homework Assignments, Quizzes, and Grades of Incomplete:

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, comprehensive exams, family obligations) if requested **at least two weeks in advance of the due date**. **Late or incomplete outside-of-class quizzes will incur a 1-point penalty when submitted**. A final grade of "incomplete" will only be given in dire circumstances and entirely at the instructor's discretion.

Final grades will be determined by the *proportion* earned out of the total possible points:

>96 = A+, 93–96 = A, 90–92 = A–, 87–89 = B+, 83–86 = B, 80–82 = B–,
77–79 = C+, 73–76 = C, 70–72 = C–, 67–69 = D+, 63–66 = D, 60–62 = D–, <60 = F

Course Software:

Participants will also need to have access to software that can estimate the models presented. Although the course will feature SAS as its primary package, other software packages (e.g., SPSS, STATA, R) can also be used to complete homework assignments. These packages are freely available to University of Iowa members through the UIowa Virtual Desktop: <https://virtualdesktop.uiowa.edu/Citrix/VirtualDesktopWeb/>

Course Textbook:

Hoffman, L. (2015). *Longitudinal analysis: Modeling within-person fluctuation and change*. New York, NY: Routledge Academic.

Other Course Readings (available via "Files" on Canvas):

Enders, C. K. (2010; chapters 3–5). *Applied missing data analysis*. New York, NY: Guilford.

Willett, J.B. (1989). Some results on reliability for the longitudinal measurement of change: Implications for the design of studies of individual growth. *Educational and Psychological Measurement*, 49, 587-602.

Academic Misconduct:

As a reminder, the University of Iowa College of Education has a formal policy on academic misconduct, which all students in this course are expected to follow. Please consult the instructor if you have questions.

Accommodating Students with Disabilities:

Students with disabilities or who have other special needs are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation.

Respect for Diversity:

It is my intent that students from ALL backgrounds and perspectives feel welcome and encouraged to participate in this course. There is no such thing as a “stupid” question. All course participants—enrolled students and auditors—should always feel welcome to ask whatever questions will be helpful in helping them understand and follow the course content. You may do so during class, in office hours, over email, or in individual appointments with the instructor (available by request).

Respect for The Rest of Your World:

The instructor realizes that this course is not your only obligation in your work or your life. If work or life events (expected or unexpected) may compromise your ability to succeed in this course, PLEASE contact the instructor for a confidential discussion (in person or over email, as you prefer) so that we can work together to make a plan for your success. Please do not wait to do so until you are too far behind to catch up!

Planned Schedule of Events (Weeks 1–8):

| Week | Date | Topics | Readings |
|-------------|-------------|---|---|
| 1 | 1/15 | Course Introduction Lecture 1: Introduction to Analysis of Longitudinal Data | Hoffman ch. 1; Willett (1989) |
| | 1/17 | Introduction to SAS | |
| | 1/18 | NO HOMEWORK DUE | |
| 2 | 1/22 | NO CLASS OR OFFICE HOURS | |
| | 1/24 | Introduction to SAS, continued | |
| | 1/25 | NO HOMEWORK DUE | |
| 3 | 1/29 | Lecture 2a: Review of General Linear Models | Hoffman ch. 2 sec 1 |
| | 1/31 | HOMEWORK #0 DUE BY 11:59 PM ONLINE: 3 points extra credit for testing the online homework system Lecture 2a, continued | |
| | | Example 2a: Review of General Linear Models | |
| | 2/1 | HOMEWORK #1 DUE BY 11:59 PM VIA CANVAS: Make Friends with SAS | |
| 4 | 2/5 | Lecture 2a, continued | Hoffman ch. 3 sec. 1 |
| | 2/7 | Lecture 3: Introduction to Within-Person Analysis and RM ANOVA Example 3a: Between vs. Within-Person Models | |
| | 2/8 | HOMEWORK #2 DUE BY 11:59 PM ONLINE: Review of General Linear Models | |
| 5 | 2/12 | Example 3b: Repeated Measures Analysis of Variance | Hoffman ch. 3 sec. 2+ Hoffman ch. 4 sec. 1-2 |
| | 2/14 | QUIZ #1 DUE BY 12:15 PM VIA CANVAS Lecture 4: Describing Within-Person Fluctuation over Time via ACS Models | |
| | 2/15 | NO HOMEWORK DUE | |
| 6 | 2/19 | Lecture 4, continued Example 4: Describing Within-Person Fluctuation over Time | Hoffman ch. 4 sec. 3+ |
| | 2/21 | Lecture 4 and Example 4, continued | |
| | 2/22 | NO HOMEWORK DUE | |
| 7 | 2/26 | HOMEWORK #3 DUE BY 11:59 PM ONLINE: ACS models | Hoffman ch. 5 sec. 1-2 Enders ch. 3-5 |
| | 2/28 | Lecture 5: Introduction to Random Effects of Time and Model Estimation QUIZ #2 DUE BY 12:15 PM VIA CANVAS Lecture 5, continued | |
| | | Example 5: Practice with Random Effects | |
| | 3/1 | REVISIONS TO HOMEWORK #1 DUE BY 11:59 PM VIA CANVAS | |
| 8 | 3/5 | Lecture 5 and Example 5, continued | Hoffman ch. 5 sec. 3+ |
| | 3/7 | Lecture 5 and Example 5, continued | |
| | 3/8 | NO HOMEWORK DUE | |

Planned Schedule of Events (Weeks 9–17):

| Week | Date | Topics | Readings |
|-------------|-------------|--|-------------------------|
| 9 | 3/12 | QUIZ #3 DUE BY 12:15 PM VIA CANVAS Lecture 6: Describing Within-Person Change Example 6: Polynomial, Piecewise, and Exponential Models of Change | Hoffman ch. 6 sec. 1-2A |
| | 3/14 | Lecture 6 and Example 6, continued | |
| | 3/15 | HOMEWORK #4 DUE BY 11:59 PM ONLINE: Linear Time Random Effects Models | |
| 10 | 3/19 | NO CLASS OR OFFICE HOURS | |
| | 3/21 | NO CLASS OR OFFICE HOURS | |
| | 3/22 | NO HOMEWORK DUE | |
| 11 | 3/26 | Lecture 6 and Example 6, continued | Hoffman ch. 6 sec. 2B |
| | 3/28 | QUIZ #4 DUE BY 12:15 PM VIA CANVAS Lecture 6 and Example 6, continued | |
| | 3/29 | NO HOMEWORK DUE | |
| 12 | 4/2 | Lecture 6 and Example 6, continued | Hoffman ch. 6 sec. 2C+ |
| | 4/4 | Lecture 2b: Interactions among Continuous Predictors Example 2b: Interactions among Continuous Predictors | Hoffman ch. 2 sec 2 |
| | 4/5 | HOMEWORK #5 DUE BY 11:59 PM ONLINE: Quadratic Time Random Effects Models | |
| 13 | 4/9 | NO CLASS OR OFFICE HOURS | |
| | 4/11 | Lecture 2b and Example 2b, continued | Hoffman ch. 2 sec 3+ |
| | 4/12 | NO HOMEWORK DUE | |
| 14 | 4/16 | Lecture 2c: Interactions among Categorical Predictors Example 2c: Interactions among Categorical Predictors | |
| | 4/18 | QUIZ #5 DUE BY 12:15 PM VIA CANVAS Lecture 7a: Review of Unconditional Models of Time Lecture 7b: Time-Invariant Predictors in Longitudinal Models Example 7b: Time-Invariant Predictors in Models of Change | Hoffman ch. 7 |
| | 4/19 | HOMEWORK #6 DUE BY 11:59 PM ONLINE: Piecewise Time Random Effects Models | |
| 15 | 4/23 | Lecture 7b and Example 7, continued | |
| | 4/25 | Lecture 7b and Example 7, continued | |
| | 4/26 | HOMEWORK #7 DUE BY 11:59 PM ONLINE: Interactions among Continuous Predictors | |
| 16 | 4/30 | QUIZ #6 DUE BY 12:15 PM VIA CANVAS Lecture 9: Multivariate Longitudinal Models (as MLM and SEM) | Hoffman ch. 9 |
| | 5/2 | Lecture 9, continued Example 9: Three Models for Multivariate Change using MLM and SEM | |
| | 5/3 | NO HOMEWORK DUE | |
| 17 | 5/10 | HOMEWORK #8 DUE BY 11:59 PM ONLINE: Time-Invariant Predictors ALL OUTSTANDING WORK MUST BE COMPLETED BY 11:59 PM | |