ED PSY 832: Theory of Hierarchical Linear Modeling

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Office hours: By appointment – please contact me by e-mail to set up a time to meet as necessary.

This course will introduce students to multilevel models, used to analyze data sets where units of observation are nested within clusters or groups. The objectives of the course are to enable students to:

- Identify the most appropriate analysis for research questions pertaining to multilevel data.
- Use statistical software to appropriately carry out the data analysis and interpret the statistical information.
- Clearly communicate the results of the statistical analyses to address the research questions of interest.

The focus will be to expose students to basic designs and analyses that they may need to use in their own research or encounter in reading research articles.

COURSE WEB PAGE: This course has a **Canvas** site associated with it that students should check on a regular basis. The site can be accessed at https://uwm.edu/canvas/ and will contain class notes, assignments, readings, resources, announcements, and any other course information. Notes for each week will be posted prior to class, and **students are encouraged to bring the notes to class**. Instructions for using Canvas are available at https://uwm.edu/canvas/students/.

PRE-REQUISITES: A graduate-level course in multiple regression (e.g., ED PSY 820) and experience with statistical software (e.g., SAS). A full course in analysis of variance would also be helpful.

TEXTBOOK: Snijders, T. A. B. & Bosker, R. J. (2012*). Multilevel analysis: An introduction to basic and advanced multilevel modeling, 2nd Edition*. Thousand Oaks, CA: Sage. ***Please bring the book to class!***

- Additional **recommended texts** for the software programs used in the course are listed on the course page. Other course readings (e.g., articles) and suggested books may also be posted on the course page.

COMPUTING: Students will be required to use statistical software packages (such as SAS or R). Students are expected to **already be proficient** in at least one software package. In-class emphasis will be on demonstrating the use of SAS; students who wish to use other software packages are welcome to do so on their own.

COURSE STRUCTURE AND STUDENT EVALUATION:

- ***Homework:***
  - Homework problems will be assigned every week and collected approximately every 2-3 weeks.
  - Assignments are to be submitted on paper at the beginning of class on the day they are due.
  - Assignments and due dates will be **posted on the course web page** on a **weekly basis** and you are strongly encouraged to do the problems each week and not leave them until they are due.
  - The homework is intended to give you hands-on practice with the concepts we cover and to ensure that you are keeping up with the material.
  - Each problem will be graded on a three-point scale to indicate the level of accuracy and understanding reflected in your answer:

Points	Interpretation
3	Complete, clear and correct.
2	Some mistakes and/or misconceptions, somewhat unclear or incomplete.
1	Many mistakes and/or misconceptions, very unclear or incomplete.
0	Not done or barely attempted.

    - You need to make sure that you are clearly communicating your **own** understanding in your answers (see also the General HW Guidelines document on the course web page).

  - Homework grades and comments are designed to provide you with feedback on the level of understanding reflected in your answers.
  - If you find the feedback insufficient, it is **your responsibility** to make sure you understand how to improve (and ask for help as needed).
- Late homework assignments will be accepted with a **10% point deduction** for each day they are late, including weekend days (in other words, you will lose 10% of the total number of points for the assignment for each day it is late). It is your responsibility to turn your homework in on the due date (even if you are absent)!
- Each student is expected to submit his or her own **independent** work. While you are allowed to discuss the concepts on homework assignments, **the work you hand in must be your own** and it is considered academic misconduct to submit anyone else's work (or words) as your own.

- ***Course projects**:*

- Students will be required to obtain a data set and complete a project that involves multilevel modeling.
  - Given the size of the class, these will be group projects consisting of 2-3 students per group. Group members (who are not auditing) are expected to contribute equally to the project, and students may be asked to evaluate the contributions of their group members.
- The project could consist of a paper describing the analysis of data as part of students' research or research interests, studying a topic not covered in the course (and applying it to data), or studying a methodological issue (e.g., comparing traditional analysis and HLM, comparing software packages, comparing analytic approaches).
  - Ideally, the completed project could potentially be submitted for presentation at a conference and/or for publication in the student's field of research.
- The project will consist of two main parts, each to be presented to the class:
  - **Part 1** will consist of an introduction section and an outline of a methods section. Specifically, students will introduce the topic of research, the data to be analyzed, the research questions, and why multilevel modeling is appropriate. This will be presented about half-way through the course. Students are welcome to discuss their project idea with the instructor before part 1 is due.
  - **Part 2** will consist of the introduction, methods, results, and conclusions. The introduction and methods can be based on feedback from Part 1. Students will present the analyses conducted, what can be concluded based on the results, and how the research questions were addressed. This will be presented at the end of the course.
- Complete instructions and rubrics for the project components will be provided several weeks before each part of the project is due.

- ***Exams**:* There will be a final exam.
  - This will be a take-home exam and must be submitted by its due date.
  - Students cannot discuss or collaborate on the exam with anyone and are expected to complete the exam **independently** and with the utmost regard for **academic integrity**.

There will be NO extra credit option in this course.
The weights assigned to each of the three components will be:

Homework	25%
Course Project	40% → 10% for part 1 and 30% for part 2
Final exam	35%

Using these weights (the homework assignments will be weighted by the number of points each assignment is worth), final scores (out of 100) will be computed and these will be converted to letter grades as follows:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
90-100	85-89	80-84	75-79	70-74	67-69	63-66	60-62	57-59	53-56	50-52	below 50

UNIVERSITY POLICIES: General policies are available at https://uwm.edu/secu/wp-content/uploads/sites/122/2016/12/Syllabus-Links.pdf. ***Please review these policies at the start of the course***.

TIME INVESTMENT: This will vary by student and by week, but my expectation is that students will spend (in addition to time attending lectures) about 3 times the in-class time on readings and assignments, for a total of about 150 hours. Please click here for a more detailed breakdown. This is an estimated workload and students will be assessed on their performance, not on the time put into the course

A note about cell phones: As a courtesy to the instructor and your fellow students, ***please turn OFF your cell phone ringer*** during class.

TENTATIVE SCHEDULE

Week	Date	Topic	Reading
1	Jan. 21	Introduction	Chapters 1, 2, 3.1-3.2
2	Jan. 28	Review: Regression and ANOVA/ANCOVA	Chapter 3 and prerequisite courses
3	Feb. 4	Random intercept model	Chapter 4
4	Feb. 11	Random intercept and slope models	Chapter 5
5	Feb. 18	Random intercept and slope models, continued	Chapter 5
6	Feb. 25	Models for longitudinal data	Chapter 15
7	Mar. 3	Project **presentations**: Part 1	
8	Mar. 10	Project **presentations**: Part 1	
9	Mar. 17	*Spring break*	
10	Mar. 24	Inferential procedures	Chapter 6
11	Mar. 31	Variance explained, study design	Chapters 7, 11
12	Apr. 7	Assumptions and model evaluation	Chapter10
13	Apr. 14	Models for three levels	Sections 4.9, 5.5
14	Apr. 21	Review: course and project questions	
15	Apr. 28	Project **presentations**: Part 2 ***Final exam distributed****	
16	May 5	Project **presentations**: Part 2	

**The final exam will likely be due two weeks after it is distributed (so on* May 12*).*