Longitudinal Data Analysis

PC 419
Wednesday 9am – 11:45am

Instructor  Stefany Coxe, Ph.D.

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Office hours:  by appointment
Email:  stefany.coxe@fiu.edu
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NOTE: Anything on this syllabus is subject to change at the Instructor’s discretion.

Course Description
This course covers topics related to statistical analysis of longitudinal data, focusing on methods used in the social sciences and health research. Topics include analysis of covariance (ANCOVA), difference scores, statistical mediation, mixed models (with correlated residuals and/or with random effects, and latent growth modeling. You will be able to analyze, interpret, and write up results using these methods.

Prerequisite(s)
Graduate coursework in analysis of variance and linear regression. We will cover a variety of topics in this course, but all of them build on a basic ANOVA and regression (general linear model) framework. A course covering multivariate statistics (such as PSY 5246C) is highly recommended.

Teaching Assistant
Our teaching assistant, April Schantz, will be available as an additional resource. You can contact her via email: aschantz@fiu.edu

Software
We will use SPSS / SAS the first part of the course. I expect you to be able to use one of these software packages (e.g., open datasets, transform variables, conduct simple analyses, etc.). I will provide information about the specific procedures you will need to know for this course.
We will use Mplus for latent growth models. I do not expect you to know anything about Mplus; I will provide information on what you need to know about Mplus for this course.

Blackboard
Lecture notes, computer code, assignments, and other materials will be posted on Blackboard before class. You should make sure they are available to you during class.

Recommended Textbook
ISBN: 978-0415874151
Other readings: I will post articles to Blackboard as needed. See reading list beginning on page 5.
Assignments

Homework
Five homework assignments covering the major topic areas of the course: (1) ANCOVA and difference scores, (2) statistical mediation, (3) mixed models with correlated residuals, (4) mixed models with random effects, and (5) latent growth models. The assignments involve running several analyses, making some decisions based on the analyses, interpreting output, and presenting the results in tables/figures and text.

Final Project
I will post several longitudinal datasets to Blackboard, along with brief descriptions of each. You will propose a project using one of these datasets (or your own dataset). This will culminate in a short paper. I want you to focus on developing longitudinal research questions and mapping them on to appropriate longitudinal analyses. More details to follow during the semester. You will need to turn in a 1 to 2 page proposal for your project during the week of March 23. The final paper is due May 4.

Presentation
A short presentation about your final project. I expect that your analyses should be complete (or nearly so) at this point; preparing the presentation should help you organize your thoughts to write the paper. The main purpose of this presentation is to give you practice presenting your analysis findings in a group setting. Presentations will take place in class on April 20 and 27. Approximately 15 minutes per person, including questions.

Grade Distribution

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework 1</td>
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<td>Homework 2</td>
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<td>Homework 5</td>
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<td>Final Project proposal</td>
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<tr>
<td>Final Project presentation</td>
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<tr>
<td>Final Project paper</td>
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Letter Grades

- $\geq 93.00$: A
- 90.00 - 92.99: A-
- 87.00 - 89.99: B+
- 83.00 - 86.99: B
- 80.00 - 82.99: B-
- 77.00 - 79.99: C+
- 73.00 - 76.99: C
- 70.00 - 72.99: C-
- 67.00 - 69.99: D+
Course and University Policies

Attendance
I shouldn’t have to tell you to attend every class. This is graduate school.
If you need to miss class for a good reason (such as illness, religious event, professional activity, or university-sanctioned event), please contact me as soon as possible to make any necessary arrangements. This is particularly important if you will miss class on April 20 or 27 (the dates of the presentations).

Special Needs
Any student with a disability or other special need that may require special accommodations for this course should make this known to the instructor during the first week of class.

Disability Resource Center:
http://drc.fiu.edu
drcupgl@fiu.edu
Graham Center 190
(305) 348-3532

Academic Misconduct
Students at Florida International University are expected to adhere to the highest standards of integrity in every aspect of their lives. Honesty in academic matters is part of this obligation. Academic integrity is the adherence to those special values regarding life and work in an academic community. Any act or omission by a student which violates this concept of academic integrity shall be defined as academic misconduct and shall be subject to the procedures and penalties set forth herein. All students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

Academic Dishonesty
Please refer to your student handbook for a description of what constitutes academic dishonesty.
I expect all students to turn in their own work.
# Tentative Course Outline

<table>
<thead>
<tr>
<th>Date</th>
<th>Topics</th>
<th>Readings</th>
<th>Assignment due</th>
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<tbody>
<tr>
<td>January 13</td>
<td>Longitudinal data and research questions</td>
<td>NJH 1 – 4</td>
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<td>January 20</td>
<td>2 wave approaches: ANCOVA, difference scores</td>
<td>NJH 5</td>
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<td>January 27</td>
<td>Statistical mediation &amp; indirect effects</td>
<td>NJH 5</td>
<td>HW 1 (2 wave)</td>
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<tr>
<td>February 03</td>
<td>Statistical mediation &amp; indirect effects</td>
<td>NJH 6</td>
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<td>February 10</td>
<td>Mixed models with correlated residuals</td>
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<td>HW 2 (Mediation)</td>
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<td>February 17</td>
<td>Mixed models with random effects</td>
<td>NJH 7</td>
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<td>February 24</td>
<td>Mixed models with random effects</td>
<td>NJH 7</td>
<td>HW 3 (Corr Res)</td>
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<td>March 02</td>
<td>Mixed models with random effects</td>
<td>NJH 7</td>
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<td>March 09</td>
<td>Mplus intro, latent growth model intro</td>
<td>NJH 9</td>
<td>HW 4 (Random)</td>
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<td>March 16</td>
<td>SPRING BREAK</td>
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<td>March 23</td>
<td>Latent growth models</td>
<td>NJH 9</td>
<td>Proposal</td>
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<td>March 30</td>
<td>Latent growth models</td>
<td>NJH 9</td>
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<td>April 06</td>
<td>Latent growth models</td>
<td>NJH 9</td>
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<td>April 13</td>
<td>Growth mixture models &amp; latent class growth</td>
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<td>HW 5 (LGM)</td>
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<tr>
<td>April 20</td>
<td>Presentations</td>
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<td>April 27</td>
<td>Presentations</td>
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<td>May 04</td>
<td>Finals week</td>
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<td>Paper due</td>
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### Additional readings

(see reading list for complete reference):

- March 2: Baldwin, Imel, Braithwaite, & Atkins (2014)
- March 9: Curran, Obeidat, & Losardo (2010)
- Maybe one more TBD
**Reading list**

**Additional approachable readings:** These articles, chapters, and books should be understandable to you while taking this course. They are aimed at applied researchers, not quantitative experts.


**Some more technical texts:** These articles, chapters, and books are aimed at quantitative researchers and statisticians. They are more technically difficult and typically include many equations.


**Example applied articles**: These articles are examples of applying latent growth models to real research questions. These are the types of articles that you will be writing in the future. These can also serve as rough templates for your final project.


Special topics: These articles, chapters, and books cover a variety of topics that we don’t have time to cover in much depth. You can consult these sources for more information about specific topics.

Categorical outcomes in mixed models:


Centering in mixed models (cross-sectional and longitudinal):


Bootstrapping:


Growth mixture models:


**Latent class and latent transition models:**


**Missing data:**


**Mediation:**


Multiple outcomes:


Time:


Two wave approaches (difference scores, partial change scores, ANCOVA):


Tu, Y.-K., Gunnell, D., & Gilthorpe, M. S. (2008). Simpson’s paradox, Lord’s paradox, and suppression effects are the same phenomenon: The reversal paradox. Emerging Themes in Epidemiology, 5:2.