

The University of North Carolina at Chapel Hill
School of Social Work

SOWO 917: Longitudinal and Multilevel Analysis
Fall Semester, 2020

INSTRUCTOR

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CLASS MEETING TIMES & OFFICE HOURS

Class meets on Wednesdays 9:00-11:50 am (by Zoom)
Office hours are Wednesday 12-2 or by appointment (by zoom)

Zoom link: Join Zoom Meeting
<https://zoom.us/j/96358661667>
Meeting ID: 963 5866 1667
One tap mobile
+13017158592,,96358661667# US (Germantown)
+13126266799,,96358661667# US (Chicago)
Dial by your location
+1 301 715 8592 US (Germantown)
+1 312 626 6799 US (Chicago)
+1 646 876 9923 US (New York)
+1 346 248 7799 US (Houston)
+1 408 638 0968 US (San Jose)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US (Tacoma)

COURSE DESCRIPTION

This course introduces the context and intuition for longitudinal and multilevel models, and the statistical frameworks, analytical tools, and social behavioral applications of multilevel modeling (MLM) and growth curve analysis.

COURSE OBJECTIVES

At the completion of the course, students will have a solid understanding of the challenges and problems in longitudinal and multilevel analysis. They will know how to choose appropriate statistical analyses that best suit the type of data and research

questions for a given study. They are expected to be able to conceptualize, design, run, interpret, and communicate results clearly and effectively in spoken and written settings based on multilevel modeling (including two-level and three-level hierarchical linear and nonlinear models, growth curve analysis, categorical MLMs, and understanding cross-classification and cross-level effects).

PRE-REQUISITES

Students are assumed to be familiar with descriptive and inferential statistics as well as multiple regression analysis. They should have statistical and statistical software background at least equivalent to that provided by SOWO918, SOCI209, PSYC282, EDUC284 (linear regression), or SOCI211 (categorical data analysis). Students without such prerequisites should contact the instructor to determine their eligibility to take this course.

SAKAI COURSE SITE

- Go to: <https://www.unc.edu/sakai/>
Enter your ONYEN
Navigate to SOWO917.001.FA20
- This syllabus is under “syllabus” on the left-hand navigation menu
- All class lecture notes, assignments, and other materials as needed will be provided under “resources” on the left-hand navigation menu
- All course materials are on the web site and students are responsible for bringing their materials to class.

STATISTICAL SOFTWARE PACKAGES

Students may choose to use Stata, SAS, or R as the primary statistical software package for the course. I will use R in classroom lectures, materials, and demonstrations.

TEXTBOOKS

No textbooks. Lecture notes will be provided for each lecture.

RECOMMENDED TEXTBOOKS

Finch, W. H., Bolin, J.E. and Kelley, K. (2014). *Multilevel Modelling Using R*. Chapman and Hall/CRC. Statistics in the Social Behavioral Sciences Series.

In Short for FBK

R Manual for MLM: http://cran.r-project.org/doc/contrib/Bliese_Multilevel.pdf

In Short for R4MLM

Rabe-Hesketh, S., & Skrondal, A. (2005). *Multilevel and Longitudinal Modeling Using Stata*. College Station, TX: Stata Press. **(If you use Stata)**

SAS Online documentation for Proc Mixed:
http://support.sas.com/documentation/cdl/en/statug/63033/HTML/default/viewer.htm#mixed_toc.htm (if you use SAS)

ASSIGNMENTS

GRADE PERCENTAGE

Class Participation	10%
Non-Graded Class Summary	20%
2 Assignments	30%
2 Research Presentations	20%
Final Project	20%

GRADING SYSTEM

The standard School of Social Work interpretation of grades and numerical scores will be used.

H = 94-100

P = 80-93

L = 70-79

F = 69 and below

POLICY ON CLASS ATTENDANCE

Class attendance is critical for team performance and individual learning. You are expected to attend all scheduled sessions. Each class session will cover a great deal of material, and you will fall behind in the course when you miss even one class. In addition, your team will be disadvantaged by your absences. It is your responsibility to inform the instructor in advance about missing a class session. **Starting after the second absence, your course grade will be reduced by 10% for each session missed.** This reduction will occur after the calculation of your final grade and will be in addition to the effects absences may have on your peer evaluations. If you miss a class, you are responsible for obtaining all notes, announcements, handouts, and assignments from the missed class from your classmates. If you miss three classes, you will be expected to meet with the instructor and Associate Dean of Student Services to discuss if further participation in the course is possible. A grade of incomplete will only be given under extenuating circumstances and in accordance with University policy.

POLICY ON INCOMPLETE AND LATE ASSIGNMENTS

Assignments are to be turned in to the instructor at the beginning of class on the due date noted in the course outline if the class meets on a due date. If assignments are sent by email, do not assume they have been received until confirmation is received. Extensions may be granted by the professor given advance notice of at least 24 hours and extenuating circumstances. **Unannounced late assignments will automatically be reduced 10%. An additional 10% grade reduction on the assignment will occur for each day late (including weekend days).** A grade of incomplete will only be given under extenuating circumstances and in accordance with University policy.

POLICY ON ACADEMIC DISHONESTY

In-class activities are designed to create a collaborative learning environment. However, graded assignments are to be completed totally independently. Once an assignment has been handed out, it is assumed that students will not discuss any aspect of the assignment together—not even general principles or topics related to the assignment. Such exploring or sharing of knowledge that is even peripherally related to class assignments gives an unfair advantage to students who

have peers from the same department or school enrolled in the course. Violations constitute violations of the honor code and will be treated as such.

Please include the honor code statement along with your signature on all assignments:

“I have neither given nor received unauthorized aid on this assignment.”

This statement indicates to the instructor that you did not consult with students or other human sources on any aspect of the assignment. It also represents your pledge that you have not made use of information or materials related to graded assignments from last year’s course. For assignments that are open book and take home (such as homeworks), consulting non-human sources (text and online sources) is encouraged. For example, you may read existing SEMNET postings, articles and Powerpoints about topics that are posted online, and book chapters, but you may not post a question related to an assignment to a discussion board. All questions about assignments and these policies should be referred to the instructor.

Please refer to the APA Style Guide (6th edition), the SSW Manual, and the SSW Writing Guide for information on attribution of quotes, plagiarism and appropriate use of assistance in preparing assignments.

If reason exists to believe that academic dishonesty has occurred, a referral will be made to the Office of the Student Attorney General for investigation and further action as required.

POLICY ON ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

The School of Social Work aims to create an educational environment that supports the learning needs of all students. The University of North Carolina – Chapel Hill facilitates the implementation of reasonable accommodations, including resources and services, for students with disabilities, chronic medical conditions, a temporary disability, or pregnancy complications resulting in difficulties with accessing learning opportunities. The Accessibility Resources and Service (ARS) Office at UNC has been established to coordinate all accommodations. If you might need accommodations at any point during the semester, please contact ARS prior to the beginning of the semester or as early in the semester as possible so that they can assist you; this process takes time. You can visit their website at <http://accessibility.unc.edu>, and contact ARS by email: accessibility@unc.edu or phone at 919-962-8300. The accommodations process starts with ARS and helps instruct Faculty at the School of Social Work on how best to proceed. As a School, we are committed to working with ARS and students to implement needed accommodations for all of our students. In addition to seeking ARS supports, please also reach out to your instructor to communicate how best your needs can be met once you have begun the ARS process.

POLICIES ON THE USE OF ELECTRONIC DEVICES IN THE CLASSROOM

We will discuss the use of laptops for in-class activities on the first day. The use of electronic devices for non-class related activities (e.g. checking messages, playing games) is prohibited. If any such uses occur during class time, laptops will not be allowed for any students for the remainder of the course.

COURSE OUTLINE (TOPICS, READINGS, AND ASSIGNMENTS)

- 1 (8/12) Introduction and course overview**
Overview and rationale for multilevel models.
Review of fundamental statistical concepts and R software.

Readings to be completed for this session:

- Lecture Note
- FBK Chapter 1
- R4MLM Section 2

**Non-graded Class Report (due at 6am, next Wed):
Summary report on this class.**

- 2 (8/19) Introduction to multilevel and hierarchical linear modeling**
Overview of MLM.
Multi-level hypotheses in social sciences
Variance decomposition, intra-class correlation & reliability
Random effects & fixed effects
Two-level model

Readings to be completed for this session:

- Lecture note
- FBK chapter 2
- R4MLM Section 3
- Hedges, L. V. (2007). Correcting a significance test for clustering. Journal of Educational and Behavioral Statistics 32(2), 151-179.

**Not-graded Class Report (due at 6am, next Wed):
Summary report on this class.**

- 3 (8/26) Two-level Multilevel models**
Writing out equations and substitution.
Estimation theory.
R packages
Variance explained and presenting results.

Readings to be completed for this session:

- Lecture Note
- FBK Chapter 3

**Not-graded Class Report (due at 6am, next Wed):
Summary report on this class.**

- 4 (9/2) Three or More-level Multilevel models**
Three-level multilevel models.
Model fitting and goodness-of-fit indices.
R packages with examples
Readings to be completed for this session:

- Lecture Note
- FBK Chapter 4

Not-graded Class Report (due at 6am, next Wed):
Summary report on this class.

5 (9/9) Longitudinal and Individual growth models

Questions related to change
 Longitudinal or panel data and specifying time
 Random effects vs. fixed effects models
 The multilevel model for change; model building

Readings to be completed for this session:

- Lecture Note
- FBK Chapter 5
- R4MLM Section 4

Graded Assignment #1 (due at 6am, next Wed):

Write a research report on MLM with data provided. The report should include at least 4 Sections:

- Section 1 is on the literature review to formulate the research questions and objectives,
- Section 2 is to discuss the regression model development.
- Section 3 is on data analysis to support the research questions, and
- Section 4 is discussions. Include all the references and analysis code as appendices.

6 (9/16) Fitting Nonlinear Models

Nonlinear models
 Nonlinear regression
 R package *nls*

Readings to be completed for this session:

- Lecture Note

Not-graded Class Report (due at 6am, next Wed):
Summary report on this class.

7 (9/23) Nonlinear Multilevel Models

Nonlinear Mixed-effect models
 R package *nlme*

Readings to be completed for this session:

- Lecture Note

Not-graded Class Report (due at 6am, next Wed):
Summary report on this class.

8 (9/30) Student Research and Presentations #1

9 (10/7) Introduction to Generalized Linear Models

Logistic Regression for Binary data
Logistic Regression for ordinal data
Multinomial logistic regression

Readings to be completed for this session:

- Lecture Note
- FBK Chapter 7
- R4MLM Section 5

**Not-graded Class Report (due at 6am, next Wed):
Summary report on this class.**

10 (10/14) Introduction to Generalized Linear Models (continue.)

Multinomial logistic regression
Models for counts data

Readings to be completed for this session:

- Lecture Note
- FBK Chapter 7
- R4MLM Section 5

**Not-graded Class Report (due at 6am, next Wed):
Summary report on this class.**

11 (10/21) Multilevel Generalized Linear Models

Multilevel models for binary data
R packages lme4

Readings to be completed for this session:

- Lecture Note
- FBK Chapter 8
- R4MLM Section 5

Graded Assignment #2 (due at 6am, next Wed):

Write a research report on MLM with data provided. The report should include at least 4 Sections:

- Section 1 is on the literature review to formulate the research questions and objectives,
- Section 2 is to discuss the regression model development.
- Section 3 is on data analysis to support the research questions, and
- Section 4 is discussions. Include all the references and analysis code as appendices.

12 (10/28) Multilevel Generalized Linear Models
Multilevel models for counts data
R packages lme4

Readings to be completed for this session:

- Lecture Note

13 (11/4) Student Research and Presentations #2

14 (11/11) Final research project writing, due 6am, 11/18.

15 (11/18 to 11/25) Final grading and submission (my job)