

**RESCH-GE 2040 Advanced Topics in Quantitative Methods:  
Multi-Level Modeling – Growth Curves (2 points)**

Marc Scott  
Fall 2013

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Lecture: Tuesdays 3:30-6:10 pm (first 7 weeks) Office: 801W Kimball Hall  
Location: 194 Mercer Room 304 Phone: 212-992-9402  
Office Hours: Tuesdays 2:30-3:30 pm, and by appointment email: [marc.scott@nyu.edu](mailto:marc.scott@nyu.edu)  
Text: Singer & Willett, *Applied Longitudinal Data Analysis* (optional, but recommended)  
Software: STATA (version 12)

Note: This course will use NYU Classes. Email is the preferred form of communication. If you call my office phone, it is best to email me as well. If you can begin the subject of your email, “RESCH-GE: 2040” that will help me to prioritize it.

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COURSE OVERVIEW: This is a course on models for multilevel growth curve data. These data arise in longitudinal designs, which are quite common to education and applied social, behavioral and policy science. Traditional methods, such as OLS regression, are not appropriate in this setting, as they fail to model the complex correlational structure that is induced by these designs. Proper inference requires that we include aspects of the design in the model itself. Moreover, these more sophisticated techniques allow the researcher to learn new and important characteristics of the social and behavioral processes under study. In this module, we will develop and fit a set of models for longitudinal designs (these are often called growth curve models). The course assignments will use state of the art statistical software to explore, fit and interpret the models.

COURSE PREREQUISITE: RESCH-GE 2004 (Advanced Modeling I: Topics in Multivariate Analysis) or equivalent. ***This prerequisite will be strictly enforced. Consult with the instructor if you wish to substitute an alternative.***

COURSE PRACTICUM: Students are strongly encouraged to enroll in RESCH-GE 2041, a practicum in multi-level growth curve models, offered in the second half of this term, in which guided research projects using the skills developed in this course are developed more fully.

LECTURE 8: The class officially consists of 7 lectures. An optional 8<sup>th</sup> lecture discusses a topic we have found useful for the practicum, and so we begin RESCH-GE 2041 with the optional lecture listed last on this syllabus.

COURSE REQUIREMENTS:

Participation: 10% You are expected to attend class and participate in class discussions.  
Homework problems: 60% There will be 4-5 problem sets that will require some computing, analysis, and interpretation.  
Project: 30% There will be a guided data analysis project instead of a final exam.

COURSE HANDOUTS: Handouts will be available on Classes by the Monday preceding class. It is the student’s responsibility to download and review the notes before coming to class.

COURSE READINGS: Weekly readings from the course text will be suggested. We cannot review material from the book during lecture, so it is essential for you to ask any questions about it in class. In addition, there may be some supplemental readings in the form of journal articles or book chapters.

Late assignment policy: Assignments are to be handed in on time.

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## SCHEDULE

<i>Date</i>	<i>Topic</i>	<i>S&amp;W Chapters</i>
Sep 3	Intro to multi-level modeling as distinct from OLS regression; data structures; introduction to model building.	1,2,3
10	Growth curve models: specification, simulation, fitting	3
17	More complex random effects distributions; model-based predictions	3
24	Exploratory techniques; model comparison/selection	2,4
Oct 1	Time-varying predictors; variance components (estimation, interpretation)	5, 6
8	Between & within “explained variance”; residuals; example of crossed effects; heterogeneous error structures	7
15	NO CLASSES SCHEDULED (NYU FALL BREAK)	
22	Introduction to Generalized Linear Mixed Models (GLMMs)	G&H*
****	EXTRA LECTURE:	
29	The choice between fixed and random effects (‘optional’ lecture – same location)	

## ASSIGNMENT SCHEDULE

<i>Date</i>	<i>Assignment</i>
Sep 17	HW #1 DUE
24	HW #2 DUE
Oct 1	---
8	HW#3 DUE
15	NYU FALL BREAK
22	HW#4 DUE
****	OFFICIAL COURSE LECTURES OVER, but extra lecture and practicum follow
Nov 15	Common Short Project Due (using data that I provide)
19	Individual ALTERNATE Short Project Due (if you decide to use your own data)

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\* G&H refers to Gelman and Hill’s “Data Analysis Using Regression and Multilevel/Hierarchical Models” (Cambridge, 2007). Chapters 5, 6, 14, 15 cover the material much more thoroughly than we do in this introduction.