

Applied Multilevel Models for Cross Sectional Data Workshop Syllabus

ICPSR Summer Workshop in Boulder, Colorado
July 15 – 19, 2013

Presented by:

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ICPSR materials will be available for download at:
<http://jonathantemplin.com>

Course Description

Multilevel models are powerful statistical models that partition multiple sources variation that may be present due to dependencies in data. Also known as hierarchical linear models mixed effects models, multilevel models extend traditional linear models (such as regression or analysis of variance) to analyses where data structures are clustered, nested, or hierarchical in nature. This workshop presents an introduction to multilevel models featuring their use in cross-sectional analyses. By attending the workshop, participants will gain an understanding of the multilevel modeling approach and will be able to evaluate and conduct basic multilevel model analyses.

The week long workshop will span topics in an integrated framework, with the first day being a review of general linear models beginning with unconditional models and the rules of model comparisons. The second day will feature two-level models: adding random components and adding single predictors, including a discussion of predictor centering techniques. The third and fourth day will be spent on multilevel models with multiple predictors and models with three or more levels. The final day will be spent discussing advanced topics: multilevel models with multivariate predictors and crossed random effects models.

The primary software package used for instruction will be SAS, but some reference examples using SPSS, Mplus, and R will be provided. The course will also include daily opportunities for hands-on practice and individual consultation. Participants should be familiar with ANOVA and regression, but no prior experience with multilevel models or knowledge of advanced mathematics is assumed.

Tentative Workshop Schedule

Day	Time	Topic
Monday	9:00-9:30	Workshop Overview and Introductions
	9:30-10:15	Lecture 1: Introduction to Multilevel Models and Hierarchical Data
	10:30-11:45	Lecture 2: The General Linear Model
	1:15-2:30	Lecture 3: Simple, Marginal, and Interaction Effects in GLMs
	2:45-4:00	Lecture 4: Statistical Distribution Assumptions of GLM/Maximum Likelihood
	4:00-5:00	Lab 1: Introduction to Data Manipulation in SAS
Tuesday	9:00-10:15	Lecture 5: Multilevel models – a Guiding Example
	10:30-11:45	Lecture 6: Centering Predictors and Variance Decomposition
	1:15-2:30	Lecture 6, Continued – with Computing
	2:45-4:00	Lecture 7: Random Slopes, Cross-Level Interactions, Interpretations
	4:00-5:00	Lab 2: Fitting Single-Predictor Multilevel Models
Wednesday	9:00-10:15	Lecture 8: Comprehensive Overview of Multilevel Models
	10:30-11:45	Example: Two-Level Clustered Data – Students within Schools
	1:15-2:30	Example: Two-Level Cross-Classified Data Models
	2:45-4:00	Example: Changes in Nesting over Time
	4:00-5:00	Lab 3: Fitting Multi-Predictor Multilevel Models
Thursday	9:00-10:15	Lecture 9: Three Level Models
	10:30-11:45	Example: Three Level Models
	1:15-2:30	Lecture 10: Multivariate Normal Distribution and Multivariate Analyses
	2:45-4:00	Lecture 11: Multilevel Models in Matrix Form
	4:00-5:00	Lab 4: Fitting Multivariate Models
Friday	9:00-10:15	Lecture 12: Multivariate Multilevel Models
	10:30-11:45	Lecture 13: Generalized Multilevel Models (Non-Normal Outcomes)
	1:15-2:30	Lecture 14: Generalized Multivariate Multilevel Models (i.e. IRT)
	2:45-5:00	Open Lab Time