CEP 935

Advanced Multivariate Data Analysis
Multilevel Modeling

Instructor: Tenko Raykov (MQM)
Venue and Time: Mo 2-6p
TA: Minh Duong (duongmin@msu.edu)

(Note: no class on Martin Luther King Day)

Prerequisites:

Students enrolled in CEP 935 should have:

(1) a strong background in univariate inferential statistical techniques (including random samples, normal distribution, parameter and interval estimations, hypothesis testing procedures, and especially simple and multiple regression analysis);

(2) a good understanding of multivariate statistics, at the level of CEP 934 (i.e., should have taken the latter course already);

(3) taken CEP932, CEP933 or equivalent, and CEP 934; familiarity with general linear models in univariate settings, such as regression, analysis of variance, analysis of covariance and related research design issues is essential; and

(4) knowledge of SPSS that would be sufficient to read in data and perform some data exploration and management (at the level of CEP 933 or equivalent).

On the next page, the syllabus of this course is presented.
Syllabus
(by general topic, and not in consecutive order; most will require more than 1 week)

1. Multilevel modeling: A preview.
2. Introduction to hierarchical/multilevel modeling.
3. The basics of multilevel modeling.
4. Two-level models: Multilevel regression analysis.
5. On the theory of parameter estimation and hypothesis testing underlying multilevel modeling.
6. Three-level models.
7. Multilevel modeling for longitudinal studies.
9. Assessing the adequacy of multilevel models.

Textbooks:

Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models. Applications and data analysis methods (2nd Edition). Thousand Oaks, CA: Sage. (In particular, we will aim to deal with most of the material in Chapters 1 through 4, 6, and 8 through 10; while chapter 5 will not be covered per se, the methods of the other chapters covered are all needed for the developments in it.)

Raykov, T. (2010). A course in multilevel modeling. Lecture notes, Measurement and Quantitative Methods, Michigan State University. (Available from the Angel website, on a weekly basis. Note that these are to be considered as copyrighted material.)

Recommended literature
(selected from voluminous body; * = particularly recommended):


Hox, J. (2002). *Multilevel analysis*. Mahwah, NJ: Erlbaum. (level about that of this course)


* Willet, J. B., & Singer, J. D. (2003). *Applied longitudinal data analysis*. New York: Guilford. (level about that of this course; uses SAS PROC MIXED)

For my lecture notes mentioned above, check regularly on the Angel website for this course, at the latest during the weekend before the pertinent Monday lecture.

**Evaluation:**

The final exam will have a multiple-choice format and will cover important concepts of this course and their relationships. (For examples of the questions asked, see, e.g., Assignment 1.) For further details on course evaluation, see file “Read me first”, also uploaded on the Angel site.