PSY 610: STATISTICAL MODELING
Winter 2006, Mon 9-12, Straub 180

Prof. Sanjay Srivastava
sanjay AT uoregon
Straub 327
Office hours: Wed 11-12 or by appointment

This course is an introduction to structural equation modeling (SEM). SEM is a general framework for researchers to test theory-driven models of their data. Within SEM it is possible to specify latent variables and test complex hypotheses about their relationships; to explicitly model hypotheses about measurement error, including correlated errors or multiple sources of error; and to evaluate the "goodness of fit" of an overall model and to compare competing models. SEM is useful in a wide variety of research applications, including experiments and interventions, observational designs, and designs with repeated measurements (such as within-subjects experiments, longitudinal and sequential designs, and multiple time series).

The course will begin with an accelerated review of regression, with an emphasis on a model-comparison approach. The majority of the course will cover basic issues in SEM. The last several weeks are reserved for advanced topics and special applications, to be determined based on class interest. Class meetings will include both classroom lectures and hands-on practice in the computer lab using the software package Mplus.

Prerequisites: Completion of PSY 613 or permission of instructor.

Software

All examples and exercises in class will be done using Mplus, which is installed on the computers in Straub 180. Students can purchase a discounted copy of Mplus for $195 (see www.statmodel.com).

Readings

Required texts:

Kenny, D. A. (2004). *Correlation and causality* (Rev. ed.). Available online at http://davidakenny.net/cm/cc.htm

Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd ed.). New York: Guilford.

Optional:

Bollen, K.A. (1989). *Structural equations with latent variables.* New York: Wiley-Interscience.

In addition to these texts, there will be required primary readings (journal articles and chapters). See the section labeled “Schedule and Readings” for a list. Readings will be posted to the course web page. You will need a password to access the readings, which I will give out in class. The web page is located at:

http://www.uoregon.edu/~sanjay/teaching/psy610/

Course requirements

The main requirement will be a data analysis project. For the data analysis project, you will analyze your own data using techniques learned in this class, and you will write up your findings. Additional details about the project will be given in class.

Additionally, throughout the course you will be assigned exercises to give you practice with the techniques and models you will be learning.

Disabilities

If you have a documented disability and anticipate needing accommodations in this course, please make arrangements to meet with me as soon as possible.

Changes

Topics, readings, course requirements, or other aspects of this course may be changed at the instructor’s discretion. Changes will be announced in class or on the course website.

SCHEDULE AND READINGS

This is my first time teaching this course, and I don't know exactly how fast or slow we will be able to cover the material. Therefore, rather than organizing the schedule by week, I have organized this course by topics. My best guess is that we will proceed at the pace of one topic per week (but another best guess is that we will deviate from my best guess!).

You should plan to always complete the readings before we cover a topic. For example, if we cover Topic 3 in a particular class meeting, then you should be sure to complete all of the Topic 4 readings before the next class meeting.

Topic 1
Introduction, basic concepts, and terminology

Kenny, ch. 1-2
Kline, ch. 1-4

Topic 2
Regression as statistical modeling

Judd, C. M. (2000). Everyday data analysis in social psychology: Comparisons of linear models. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in personality and social psychology* (pp. 370-392). New York: Cambridge.

Topic 3
Models with observed variables (path analysis)

Kline, ch. 5
Kenny, ch. 3-4

Topic 4
Measurement error and nonrecursive models

Kline, ch. 6 & 9
Kenny, ch. 5-6

Topic 5
Measurement models with latent variables

Kline, ch. 7

John, O. P., & Benet-Martinez, V. (2000). Measurement: Reliability, construct validation, and scale construction. In H. T. Reis & C. M. Judd (Eds.), *Handbook of research methods in personality and social psychology* (pp. 339-369). New York: Cambridge.

Edwards, J. R., & Bagozzi, R. P. (2000). On the nature and direction of relationships between constructs and measures. *Psychological Methods, 5,* 155-174.

Topic 6
Structural models with latent variables

Kline, ch. 8

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological Bulletin, 103,* 411-423.

Cole, D. A., Maxwell, S. E., Arvey, R., & Salas, E. (1993). Multivariate group comparisons of variable systems: MANOVA and structural equation modeling. *Psychological Bulletin, 114,* 174-184.

Topic 7
Identification and number of indicators

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the questions, weighing the merits. *Structural Equation Modeling, 9,* 151-173.

Rigdon, E. E. (1995). A necessary and sufficient identification rule for structural models estimated in practice. *Multivariate Behavioral Research, 30,* 359-383.

Topic 8
Fit, respecification, and model comparisons

Kline, ch. 12

MacCallum, R. C., Roznowski, M., & Necowtiz, L. B. (1992). Model modifications in covariance structure analysis: The problem of capitalization of chance. *Psychological Bulletin, 111*, 490-504.

MacCallum, R. C., Wegener, D. T., Uchino, B. N., & Fabrigar, L. R. (1993). The problem of equivalent models in applications of covariance structure analysis. *Psychological Bulletin, 114,* 185-199.

Topics 9+
Advanced issues and applications

Topics and readings to be determined, depending on progress and class interest. Possible topics include: missing data; models with means (including latent growth curve models); multiple groups and measurement equivalence; multi-trait multi-method matrices; phantom variables; bootstrapping.