Structural Equation Models and Latent Variables: 
An Introduction

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Overview

This workshop provides an introduction to general linear structural equation models (SEMs). These models are sometimes referred to as “LISREL” or “covariance structure” models. The course provides an overview of and experience in constructing and estimating SEMs. The topics treated include: path analysis, confirmatory factor analysis, structural equations with observed variables, the incorporation of multiple indicators and measurement error into structural equations, alternative estimation procedures, and the assessment of model identification, fit, and modification.

My goal is to provide a firm basis for continued study and research with SEMs. It is your “follow-up” after the course that is most important to the eventual mastery of this material.

Prerequisites

Participants should have a good grasp of multiple regression and be familiar with basic matrix notation and matrix operations. Background in factor analysis or path analysis is helpful, but is not necessary.

Schedule

Monday to Friday

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>9:00 AM - 12:00 PM</td>
<td>Lecture</td>
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<tr>
<td>1:30 PM - 3:30 PM</td>
<td>Lab</td>
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<tr>
<td>3:30 PM - 4:30 PM</td>
<td>Q &amp; A Session</td>
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Note: On some days the lecture, lab, or Q.&A. session might run over these times.

Texts:


Optional:

If you already have access to a particular SEM package, you might want to purchase or bring a copy of the manual to the workshop. Our computer lab will have at least one or two SEM packages available for participant use.
Topics and Readings

I. Preliminaries

Bollen, Kenneth, “Model Notation, Covarances, and Path Analysis,” Chapter 2 in *Structural Equations with Latent Variables (SELV)*.


II. Classical Econometric Models and Random Measurement Error

Bollen, “Structural Equations with Observed Variables, Chapter 4 in *SELV*.

III. Measurement Models and Confirmatory Factor Analysis (CFA)


Bollen, “Confirmatory Factor Analysis,” Chapter 7 in *SELV*.

IV. Structural Equations with Latent Variables


Further readings:

During the workshop, participants will not be able to read much beyond the above readings and the relevant material from the software manuals. After the course, additional readings are available in several sources. Arbuckle’s AMOS manual, Bentler’s EQS, Jöreskog and Sörbom’s LISREL 8 book, the Muthén’s Mplus, the course text, and Bollen and Long’s (1993)Testing Structural Equation Models (Sage) have extensive bibliographies. In addition, see J.T. Austin and L.M. Wolfe (1991), “Annotated Bibliography of Structural Equation Modeling: Technical Work,” British Journal of Mathematical and Statistical Psychology, 4:93-152. An update of this is in Austin and Wolfe (1996), Structural Equation Modeling, 3:105-175. The SEMNET listserv and its archives (http://bama.ua.edu/archives/semnet.html) and the journal Structural Equation Modeling are two other places to find more SEM readings.