This course is an introduction to structural equation modeling (SEM). SEM is a general framework for building, comparing, and evaluating theory-driven models of data. SEM can be used to test a variety of complex hypotheses about measurement, association, causation, and change over time. Specific techniques that are part of SEM include path analysis, confirmatory factor analysis, causal models with latent variables, growth curve models, and various techniques for modeling temporal dynamics. SEM is useful in a wide variety of research applications, including the analysis of experiments and interventions, observational designs, and designs with repeated measurements (such as within-subjects experiments, longitudinal studies, and multiple time series).

The course will begin by covering principles of causal inference, followed by an accelerated review of multiple regression with an emphasis on model building and comparison. The majority of the course will cover “classical” SEM applications like confirmatory factor analysis and causal modeling of between-subjects, cross-sectional data. These classical applications are the building blocks for more modern developments which we will cover as time permits, such as techniques for modeling data from repeated measures and longitudinal designs. Class meetings will include both classroom lectures and hands-on practice in the computer lab.

Prerequisites: Completion of PSY 611, 612, and 613. (Students who wish to take this course concurrently with 613 should contact the instructor.)

Software

All examples and exercises in class will be done using Mplus, which is installed on the computers in Straub 180. Students can also purchase a discounted copy of Mplus for their own computers (see www.statmodel.com). The free demo version available on their website is too restricted to be useful for this course.

Readings

Required text:


Optional text:


In addition to these texts, you will be assigned a number of required articles and chapters. See the section labeled “Schedule and Readings” for a list.
Grading and course requirements

40%  Participation, in-class exercises, and homework
60%  Final project (due Friday, June 4)

Final project. For the final project, you will have a choice of submitting either a proposal or a data analysis writeup. If you do a proposal, you will propose an application of SEM in a dataset that you might collect in the future. (This may be already-existing data, or it may be data that you would collect.) In a data analysis writeup, you will actually analyze some data and write up what you did and found out. More details will be given in class. Before you start your project, you should read:


Disabilities

If you have a documented disability and anticipate needing accommodations in this course, please contact Disability Services (http://ds.uoregon.edu) and make arrangements to meet with me as soon as possible. You will need to provide me with a letter from DS indicating what accommodations are needed.

Changes

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

Always complete readings before the class meeting where we cover a topic. The tentative plan is to cover 1 topic per week; however, our actual progress may be faster or slower depending on the pace of our class meetings.

Topic 1
Introduction; principles of causal inference

Kline, ch. 1-4


Optional


Topic 2
Regression as statistical modeling


Topic 3
Models with observed variables (mediation and path analysis)

Kline, ch. 5-6


Optional – will be discussed in class


Topic 4
Measurement models (a.k.a. confirmatory factor analysis)

Kline, ch. 7


**Topic 5**

**Structural models with latent variables**

Kline, ch. 8


**Topic 6**

**Not so fast! Challenges to inference and interpretation**


**Topics 7-10**

Topics and readings TBA, depending on (a) how quickly we’ve gotten to this point and (b) class interest. Possible topics include:
* Causal loops
* Growth curve models
* Other models for development and change
* Multiple groups models
* Advanced measurement topics