Covariance Structure and Factor Models

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January 4, 2011

Instructor: Sungjin Hong
Office: 429 Psychology (hongsj AT illinois DOT edu)
Class meetings: Tuesday & Thursday, 3 – 4:50pm, Psychology room 29 (or 219A/289)
Office hours: Wednesday, 2 – 3pm or by appointment

Text: Bollen, K.A. (1989). *Structural equations with latent variables*. New York: Wiley.
       Additional reading materials will be advised as we proceed.

       Note: all other course materials (lecture slides, data, etc.) will be available to
       download in Compass.

Prerequisites: PSYC 594/ STAT571/ SOC587

This course is to introduce to covariance structure models, linear structural equations, and factor analysis (mainly on confirmatory FA, and exploratory FA to be covered later as an additional topic); to make familiar with key methodological issues (e.g., identification and parameter estimation problems); to enable to use a computer package (AMOS).

Grading:
Homework (30%): 5 analysis problems to be assigned, one in each lab
Midterm exam (35%): in-class closed-book exam (March 19) on topics covered by then
Team project (35%): due on the last day of the class (May 5).

For the team project, each team will (a) identify a published paper that contains flaws or weakness (in problem posed, analysis, interpretation of results, etc.), critique it and propose an alternative analysis, (b) conduct a (theoretically and/or empirically) improved analysis using SEM. Part (a) may be discussed with me before you proceed to (b). Each team is required to present its project in class (April 23 – May 5; order of presentation to be determined randomly). Each team will be given 50 min in total, of which the presentation itself should last no more than 40 min so as to use the remaining 10 min for answering questions (any team member can answer a question). Role taking within a team should be fair and must be agreed by all members.

You may work on homework with your peer students in the class, but you should author your homework. Any essentially identical homework submitted will be considered as cheating (a violation of academic integrity defined in the Student Code, Article 1. Part 4. Academic Integrity; see http://www.admin.uiuc.edu/policy/code/article_1/a1_1-401.html) and be subject to an ethical discipline.

Psychology room 219A and 289 will be used for AMOS hands-on labs. Dates and the room of these lab sessions are listed in the schedule below; any change to this schedule

will be notified by email at least one week before. Room 289 is also reserved for Wednesday 3-5pm for individual use. All computers in 219A and 289 have AMOS available in SPSS. Students may use other software of their choice (with my help limited).

To use the computers in room 219A and 289, you will need a Novell account. Non-psychology students will be given an account ID and password. If using an account provided in this class, make sure in the log-in window to put ".p588.class.psych" for "contexts" (click the "advanced" button to pull down the context field).

I will use a group email for announcements and some ad hoc discussion. You are encouraged to be officially enrolled, either for credit or auditing. If you can't officially register, you may provide an email address to be included in the group email list.

The following are (1) topics to be covered approximately by early April and (2) further topics to discuss thereafter as time permits:

1.1. Backgrounds: notation, diagramming convention, related matrix algebra – Ch 1, 2, Appendices A & B
1.2. SEM with observed variables – Ch 4 (pp. 80-123)
1.3. Consequences of measurement error – Ch 5
1.4. Confirmatory factor analysis – Ch 7
1.5. SEM with latent variables – Ch 8, 9

2.1. Exploratory factor analysis

If time allows:
2.2. Growth curve modeling
2.3. Multilevel SEM

Tentative schedule:

1.1. Lecture 1-3, Preliminaries: Jan 18, 20, 25
     Lab 1: AMOS interface and basics, Jan 27 (room 219A)

1.2-3. Lecture 4-6, Observed variable model & measurement: Feb 1, 3, 8
     Lab 2: AMOS modeling with observed variables, Feb 10 (room 289)

1.4. Lecture 7-10, Confirmatory factor analysis: Feb 15, 17, 22, 24
     Lab 3: AMOS for CFA, Mar 1 (room 219A)

1.5. Lecture 11-13, General model I: Mar 3, 8, 10
     Lab 4: AMOS for general model I, Mar 15 (room 289)

Midterm Exam, Mar 17 (in class)

1.5. Lecture 14-16, General model II: Mar 29, 31, Apr 5
     Lab 5: AMOS for general model II, Apr 7 (room 219A)

2.1. Lecture 17-19, Exploratory factor analysis: Apr 12, 14, 19

Project presentations: Apr 21, 26, 28, May 2