

PSYCHOLOGY 207  
Linear Structural Modeling  
Fall 2013

INSTRUCTOR:

Sarah Depaoli (sdepaoli@ucmerced.edu)

Office Location: SSM 312A

Office Phone: (209) 349-1198 (although email will result in a faster response)

Office Hours: F: 8:00-10:00 a.m., or by appointment (*limited # per week*)

Course Website: <http://faculty1.ucmerced.edu/sdepaoli>

TEXT:

Kaplan, D. (2009). *Structural Equation Modeling: Foundations and Extensions*. Thousand Oaks, CA: Sage.

\*Note that there will be additional readings provided by the instructor that you will be responsible for.

COURSE TIME/LOCATION:

TR 10:30 - 11:45 a.m., El Capitan, SSM (2nd floor in “The Rock”)

*Note that the time and place has changed (unofficially). Please see me if this is a problem.*

COURSE DESCRIPTION:

This course covers topics comprising the field of structural equation modeling (SEM). You will find that there is some topic overlap with other courses (e.g., PSY 202b and PSY 209), but we will cover these topics in more depth and detail specifically related to SEM. Basic topics such as matrix algebra and path analysis will be covered before moving onto discussing measurement models and estimation in more detail. We will cover topics such as: invariance testing, testing model fit, multilevel SEMs, categorical items, scale development, mixture modeling, etc. We will primarily be using the *Mplus* software program; you will need to have access to the full version (i.e., not the student version) for this course (see discussion below).

COURSE GOALS:

In this course, you will:

- Learn basic linear algebra and understand how it relates to SEM
- Review path analysis and simple measurement models covered in 202b
- Learn how to simulate data to illustrate statistical issues in SEM
- Learn about model fit and modification
- Learn how to model and interpret interactions involving both categorical and continuous latent variables

- Learn about multi-group analyses and related invariance testing techniques
- Learn about multi-level and mixture SEMs
- Become more comfortable with presenting statistical topics related to SEM
- Refine writing skills related to statistical modeling, primarily SEM

## PREREQUISITES:

- Graduate status in Psychology or consent of the instructor. The class assumes that students have had prior exposure to statistics equivalent to an undergraduate introductory course, Psychology 202a (Advanced Psychological Statistics I), and Psychology 202b (Advanced Statistics II).
- We will largely be using the *Mplus* software program to carry out model estimation in this course. The lecture content and course assignments will focus heavily on this programming language. If you do not have experience with this programming environment, please see the instructor to set up a “catch-up” meeting. You will need the full version (i.e., not the student version) of this program. If you do not have access to the full version of *Mplus*, then you may use a computer in the Depaoli Lab. Note that remote access is possible (instructions to follow).

## COURSE GRADES:

Grading is based on homework assignments (40%), discussion facilitation (10%), an in-class presentation (20%), and a final class project (30%).

Grades will be assigned based on a percentage scale. Homework assignments will be graded based on 10 points. The discussion facilitation, presentation, and final project will be graded based on 100 points. A weighted linear combination will be taken at the end of the semester to determine the final course grade using the following criteria:

Percentage	Grade
95-100	A
92-94	A-
89-91	B+
85-88	B
82-84	B-
79-81	C+
...	

## HOMEWORK ASSIGNMENTS:

Assignments will be handed out in class and may incorporate a combination of hand calculations, data analysis, and conceptual problems. All datasets for these assignments will be provided by the instructor. You will typically have one week to complete these assignments. Assignments are due at the beginning of class on the date specified.

- Note that the full version of *Mplus* 7.11 will be required for the assignments. Access can be obtained through logging onto one of my lab computers via remote desktop.
- Be sure to connect to the VPN if working from home.
- Search “Remote Desktop” on your computer
- The IP address for my lab computer is: 169.236.170.151
- You must log out when you are done
- I believe only one person can be signed in at a time, so coordinate with one another to be sure you all have adequate access. If there is a problem with this, please notify me ASAP.
- **DO NOT SAVE FILES TO MY LAB COMPUTER!!** This is really important because the next person logging in could just take your homework files and turn them in as their own. Be sure to clean any files off of my computer before logging out.

### DISCUSSION FACILITATION:

Each student will be required to (co)facilitate a discussion day on a pre-determined topic and to participate in “off-weeks”. Specific details are presented in a handout.

### FINAL PRESENTATION:

Each student will be required to present a conference-style presentation to the class about their final paper. Specific details are presented in a handout.

### FINAL PAPER:

You will be expected to write a paper in APA style using some of the techniques that you have learned this semester. I encourage you to use your own data if appropriate. If you do not have access to your own data, I will provide you with some resources where you can obtain free data sets. The paper will be comprised of an introduction where you substantively justify your variable(s) and model(s). You will need to write a complete methods section which describes your variable(s) and design—this needs to also include a (brief) description of the methods that you will employ. This methods section will be followed by a results section where you will describe any relevant diagnostics and results; you should include any relevant figures and tables as well. Finally, you will need to write a discussion section tying your findings and your introduction together. The final product that you hand in should be a manuscript of (near) publishable quality. I recognize that it is perhaps unreasonable to request a manuscript ready for submission at the end of a one-semester course, however this paper should be of the quality that only minor tweaking and/or expanding of thoughts are needed before submission. Grading will be based on several different components, including substantive development of the model, handling of model diagnostics/fit, correct interpretation of model results, description of estimation processes, and APA style. I will also grade on the professionalism and technical aspects of your writing. This assignment will be due during finals week. I will not “pre-read” any assignments (i.e., I am not “grading” your paper multiple times throughout the course), but I am more than happy to discuss your papers with you (e.g., direction of analysis, aspects of the introduction, etc.) at any point during the semester. More details on this

assignment will be provided in another handout, and a short summary of your data source and topic will be due October 1 in class.

### INCOMPLETE GRADES:

A grade of “I” (Incomplete) will be assigned only at the discretion of the instructor and only in the event of extraordinary circumstances. A written request must be filed and a written approval granted before the Incomplete may be taken.

### ACADEMIC INTEGRITY:

Students should be familiar with University policies on academic honesty. A general code of conduct for the University of California can be found at:

<http://www.ucop.edu/ucophome/coordrev/ucpolicies/aos/uc100.html>.

- Basically, do not cheat or plagiarize. This will earn you a very uncomfortable meeting with the professor and a **ZERO** on the assignment.
- **There is NO exception to this rule!!**
- Note that this policy will be upheld equally for people trying to copy work and also for people trying to help others.
- If you have questions about this policy and/or the consequences listed above, please see the professor as soon as possible.
- Students are encouraged to work together on computational aspects of the homework assignments using *Mplus* (or akin). However, it is expected that you work independently on hand-calculation, discussion, and interpretation portions of the assignments. The words you submit in your written assignments should be entirely your own.
- Students are encouraged to seek feedback on course projects from fellow students. However, it is expected that each student is conducting his/her own statistical analysis and all writing must be done independently. Any hint otherwise will result in a grade of ‘zero’ on the assignment.

### STUDENTS WITH SPECIAL NEEDS:

UCM provides individuals with disabilities reasonable accommodations to participate in educational programs, activities, and services. Students with disabilities requiring accommodations to participate in class activities or meet course requirements should contact the professor as early as possible, and also contact the UCM Disability Services Center located in Room 107 of the Kolligian Library (209-381-7862) to obtain their assistance and coordination in working with this course.

### CLASSROOM CIVILITY:

Each UCM student is encouraged to help create an environment during class that promotes learning, dignity, and mutual respect for everyone. Students who speak at inappropriate times, sleep in class, display inattention, take frequent breaks, interrupt the class by coming to class late, engage in loud or distracting behaviors, use cell phones or other electronic

devices in class, use inappropriate language, are verbally abusive, display defiance or disrespect to others, or behave aggressively toward others could be asked to leave the class and be subjected to disciplinary action.

## COURSE OUTLINE:

\*\*Note that the schedule of course content and assignment dates are subject to change, but the final project and presentation will be held on fixed dates.

Week 1 (8/29): *Quick Intro to Class*

- Assignments: Be sure you can use remote desktop; email me after you get it to work for you; groups formed for discussion facilitation

Week 2 (9/3 & 9/5): *Intro to SEM; Path Analysis*

- Reading for the week: Kaplan CH 1 & 2; Boomsma (2000); McDonald & Ho (2002)

Week 3 (9/10 & 9/12): *Path Analysis, R: Reading Output*

- Reading for the week: Hu & Bentler (1999); Nylund et al. (2007)
- Assignments: HW 1 handed out

Week 4 (9/17 & 9/19): *T: Reading Output; EFA/CFA*

- Reading for the week: Kaplan CH 3

Week 5 (9/24 & 9/26): *EFA/CFA*

- Reading for the week: Kaplan CH 3
- Assignments: HW 2 handed out

Week 6 (10/1 & 10/3): *ITR: James/Peter; SEM & Multigroup*

- Reading for the week: Moore, Reise, Depaoli, & Haviland (*under review*); Kaplan CH 4; Bou & Satorra (2010)

Week 7 (10/8 & 10/10): *Invariance; R: Chris/Steven*

- Reading for the week: Hoyle CH 23
- Assignments: HW 3 handed out

Week 8 (10/15 & 10/17): *NO CLASS: Instructor out of Town*

Week 9 (10/22 & 10/24): *Mediation, Indirect Effects, Latent Interactions; R: Anna E./Holly*

- Reading for the week: Hoyle CH 25, 26

Week 10 (10/29 & 10/31): *Assumptions & Model Modification*

- Reading for the week: Kaplan CH 5, 6; Kaplan & Depaoli (2011)

Week 11 (11/5 & 11/7): *Categorical Data & Missing Data; R: Ruben/Katie*

- Reading for the week: Hoyle CH 12, 17
- Assignments: HW 4 handed out

Week 12 (11/12 & 11/14): *Multilevel SEM*

- Reading for the week: Hoyle CH 30; Kaplan CH 7; Kaplan, Kim, & Kim (2009)
- Assignments: HW 5 handed out

Week 13 (11/19 & 11/21): *Simulation & Mixtures; Scale Construction*

- Reading for the week: Hoyle CH 6; Muthen & Muthen (2002); Kaplan CH 9; Hoyle CH 28

Week 14 (11/26 & 11/28): *NO CLASS: "Cutting Carrots Day" & Thanksgiving*

Week 15 (12/3 & 12/5): *BSEM & Class Presentations*

- Reading for the week: Hoyle CH 38; Muthen & Aspourhov (2012a,b); MacCallum et al. (2012); Rindskopf (2012)
- Thursday: **(1) Ruben; (2) Chris; (3) Peter**

Week 16 (12/10 & 12/12): *Class Presentations*

- Tuesday: **(1) Holly; (2) Steven; (3) Anna**
- Thursday: **(1) Katie; (2) James**

FINAL EXAM WEEK:

12/17 (Tuesday): Final Projects DUE by 5:00pm in my box, under my office door, or hand-delivered. **NO LATE PAPERS...AND 5:01pm IS CONSIDERED LATE!**. You will need to turn in an electronic version AND a hard copy.