ADVANCED TOPICS IN STATISTICS FOR PSYCHOLOGICAL RESEARCH (14200)

Psychology 5991
Winter 2018
Wednesdays 9:00am – 12:20pm

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Office Hours: Thursdays 1:30pm – 2:30pm
         Email me for other meeting times if needed

Course Description	This course serves as a hands-on introduction to structural equation modeling (SEM), a flexible technique for modeling relationships among variables. Course topics will include confirmatory factor analysis (CFA), traditional path analysis, advanced multivariate regression, and basic principles of model building. This includes specification, identification, estimation, hypothesis testing, and modification in basic and advanced SEMs. The overall objective of this course is to provide students with the necessary knowledge to apply SEM using the M*plus* software package. In this course SEM will be used for numerous purposes, including scale construction and evaluation, construct validation, theoretical development, and investigating special research designs involving mediation, moderation, multi-group analyses, and latent growth modeling. Other topics may include missing data techniques, advanced SEM models with normal and non-normal (binary, Likert, etc.) indicators and dependent variables, exploratory SEM, hierarchical CFA, multilevel SEM. This course will emphasize M*plus* and will use the software at regular intervals to illustrate each technique with hands-on activities and demonstrations. **Course Prerequisite**: PSY 501, 502, 511, and 512 **Required Text(s):** Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). New York, NY: Guilford Press. Additional Resources: Companion website for textbook - goo.gl/63O33e Demo version of M*plus* (most recent, Version 8) - www.statmodel.com User's Guide for M*plus* - http://statmodel.com/download/usersguide/MplusUserGuideVer_8.pdf
Outcomes and Learning Objective	Course objectives: • Gain familiarity with M*plus* software and analytical framework • Demonstrate an understanding of fundamental issues associated with structural equation modeling • Gain skills associated with determining model identification, specification, estimation, and model fit • Demonstrate procedures for remedying various common errors that may occur in SEM analyses • Develop an individual research project, focused on demonstrating and presenting the results of a structural equation model These objectives will be accomplished through lectures, hands-on activities, assigned readings, short quizzes, and the presentation and write-up of a research project chosen by each student.

Student Conduct: Students are expected to adhere to the guidelines for student conduct outlined in the Graduate Student Handbook.

Attendance: It is expected that you will attend class regularly. However, if you need to miss class because of an emergency (e.g., severe illness, death of a close relative), then let me know as soon as possible.

Do Not Fall Behind: It is critical that you keep up with the material in this class. To this end, I recommend you complete the readings in advance of our weekly class, and be practicing the analytical methods covered on your own datasets. We will cover a great deal of material this semester so you will have considerable trouble if you fall behind.

Class Participation: You are expected to be an active participant in this class. You will learn more effectively if you take part in class by asking questions, answering questions, and engaging in discussions.

Special Considerations: A student with a documented learning or physical disability must contact the **Office of Disability Support Services**, 103A North Foundation Hall, (248) 370-3266, and inform the professor of special needs during first week of classes. For more information, visit http://www.oakland.edu/dss.

Policy on Academic Misconduct: The University's regulations that relate to academic misconduct will be fully enforced. Any student suspected of cheating and/or plagiarism will be reported to the Dean of Students and, thereafter, to the Academic Conduct Committee for adjudication. Anyone found guilty of academic misconduct in this course may receive a course grade of 0.0, in addition to any penalty assigned by the Academic Conduct Committee. Students found guilty of academic misconduct by the Academic Conduct Committee may face suspension or permanent dismissal. The full policy on academic misconduct can be found in the General Information section of the Undergraduate Catalog.

Excused Absence Policy: University excused absences applies to participation as an athlete, manager or student trainer in NCAA intercollegiate competitions, or participation as a representative of Oakland University at academic events and artistic performances approved by the Provost or designee. For the OU excused absence policy, see http://wwwp.oakland.edu/provost/policies-and-procedures/.

Veteran Support Services: The office of Veteran Support Services (VSS) is responsible for giving support services to more than 300 veterans, service members, and dependents of veterans. VSS is staffed with personnel who are veterans and current or former students. Any student veteran or dependent of a veteran requiring assistance with navigating the Veterans Administration, understanding service-related benefits, or requires referrals to campus and community resources should contact one of the Veterans Liaisons by visiting 116 North Foundation Hall, or phoning 248-370-2010. http://wwwp.oakland.edu/veterans/

Add/Drops & Incompletes: The University add/drop and incomplete grade policies will be explicitly followed. It is the student's responsibility to be aware of the University deadline dates for dropping the course.

Grading Criteria

Course Evaluation: Your final grade in this course will be based on active participation, a brief (~10 minute) Chapter/Topic review of a readings, four short quizzes, and an individual research project that will focus on the use of a structural equation modeling technique. The grade for the individual research project will comprise a 20 minute presentation, as well as a research paper, which will need to be submitted complete with syntax and full software output. The percentage break-down is as follows:

Participation	20%
Chapter/Topic review	10%
Quizzes (4 @ 6.25% each)	25%
Presentation	15%
Major research paper	30%
Total:	100%

Participation: Promptly coming to class (including student presentations during the last two classes), and being engaged in the ongoing class discussion. During the student presentations two non-presenting students will be assigned to comment on specific presentations, and all others will be required to submit a thoughtful question or comment to me based on each presentation that day.

Chapter/Topic review: Students will be required to lead an in-class discussion of one of the weekly chapters or supplemental readings. The review will consist of guiding a short presentation and discussion around the most important points raised in the readings. Students will be asked to review one of the assigned chapters from the Kline textbook, or one of the Supplemental Readings. Chapter topics will be assigned in advance for each week a student-led review will be occurring. For some weeks, students may choose which of the Supplemental Readings they will be incorporating into their discussion.

Quizzes: There will be four short (30 minutes max.) tests occurring at approximately the mid-point of selected classes (see Tentative Schedule below). These quizzes will usually consist of three-four broad questions drawn from core material in the lecture and textbook. Tests items will focus on understanding and application of relevant SEM procedures (e.g., "Draw a multiple regression model with three predictors using SEM symbols indicating all paths, correlations, and residuals").

Major Research Project	**Major research project:** Students will be required to conduct analyses for an individual project consisting of a measurement/confirmatory factor analysis component and a full structural equation model component. In the SEM model you will be required to include one of the following: (1) a mediation analysis (2) a moderation (interaction) analysis, (3) a multi-group analysis, or (4) a longitudinal analysis. You will need to use a real (or simulated) data set, develop hypotheses/research questions, conduct the SEM and related analyses, interpret the results and write a report of the results and your interpretations and conclusions. You will have the choice between: 1. providing your own data (please check with any coauthors that you can use the data for this purpose) 2. using a large data set that I can provide 3. creating a simulated dataset that may be used as part of a research proposal (I will explain this option) Note that you will need to have your topic and dataset approved by January 31st. As noted, the grade for the research project will comprise a 20 minute presentation, as well as a research paper, written as an APA research article but with greater emphasis on the Results and Discussion sections, with syntax and software output attached in an Appendix. The presentation dates and times will be at the first organizational meeting (Jan. 3), and the research paper is due by **5pm on Friday, April 20th**.

Grade Breakdown

Percentage grade	GPA	Percentage grade	GPA	Percentage grade	GPA
95-100	4.0	79	2.9	63	1.3
94	3.9	78	2.8	62	1.2
93	3.8	77	2.7	61	1.1
92	3.7	76	2.6	60	1.0
91	3.7	75	2.5	59 and below	0.0
90	3.6	74	2.4		
89	3.5	73	2.3		
88	3.5	72	2.2		
87	3.4	71	2.1		
86	3.4	70	2.0		
85	3.3	69	1.9		
84	3.3	68	1.8		
83	3.2	67	1.7		
82	3.2	66	1.6		
81	3.1	65	1.5		
80	3.0	64	1.4		

Tentative Class Schedule and Outline

1	Jan. 3	Organizational meeting	
2	Jan. 10	Introduction and overview	Ch. 1, 2
3	Jan. 17	Building blocks and M*plus* framework **Chapter Reviews - TBD**	Ch. 3, 4, 5, SR 1
4	Jan. 24	Model specification; Path model identification **Chapter Reviews - TBD**	Ch. 6, 7, SR 2
5	Jan. 31	Confirmatory factor analysis **Confirm research paper topic and dataset** **QUIZ #1**	Ch. 9, SR 3
6	Feb. 7	CFA/Structural regression models **Chapter Reviews - TBD**	Ch. 13, SR 4
7	Feb. 14	Structural regression models **QUIZ #2**	Ch. 10, 14
--	*Feb. 19-25*	*Winter Recess*	
8	Feb. 28	Model fit **Chapter Reviews - TBD**	Ch. 11, 12
9	Mar. 7	Mean structures and latent growth models **Chapter Reviews - TBD** **QUIZ #3**	Ch. 15, SR 5, 6
10	Mar. 14	Multi-group models **Chapter Reviews - TBD**	Ch. 16, SR 7-8
11	Mar. 21	Mediation and moderation **Chapter Reviews - TBD**	Ch. 17, SR 9-10
12	Mar. 28	Loose ends: Multilevel models, exploratory SEM, mixture models … **Chapter Reviews - TBD** **QUIZ #4**	Ch. 17, 18, SR 11-16
13	Apr. 4	Student presentations (*might be hosted in Pryale 130*)	
14	Apr. 11	Student presentations (*might be hosted in Pryale 130*)	
	Apr. 20	**Major research papers due @ 5:00pm**	

SR = Supplemental Reading, see below.

Student Support Services

- **Important dates - https://wwwp.oakland.edu/registrar/important-dates/**
- **Writing Center - http://wwwp.oakland.edu/ouwc/**
- **Tutoring Center - https://wwwp.oakland.edu/tutoring/**
- **Disability Support Services - https://wwwp.oakland.edu/dss/**
- **Dean of Students - https://wwwp.oakland.edu/deanofstudents/**
- **Student/Academic Advising - https://wwwp.oakland.edu/advising/**
- **Graham Health and Counseling Center - https://wwwp.oakland.edu/ghc/**
- **Campus Police - https://oupolice.com/**

Supplemental reading list – I will provide PDFs for resources not available through OU Libraries

SR 1:
Baraldi, A. N., & Enders, C. K. (2010). An introduction to modern missing data analyses. *Journal of School Psychology*, *48*, 5–37. doi:10.1016/j.jsp.2009.10.001

SR 2:
Meade, A.W., Behrend, T.S., & Lance, C.E. (2009). Dr. StrangeLOVE, or: How I learned to stop worrying and love omitted variables. In. C.E. Lance & R.J. Vandenberg (Eds.), *Statistical and methodological myths and urban legends* (pp. 89-106). New York, NY: Routledge.

SR 3:
Williams, L.J., Ford, L.R., & Nguyen, N. (2002). Basic and advanced measurement models for confirmatory factor analysis. In S.G. Rogelberg (Ed.), *Handbook of research methods in industrial and organizational psychology* (pp. 366-389). Malden, MA: Blackwell Publishers Inc.

SR 4:
Williams, L. J., Vandenberg, R. J., & Edwards, J. R. (2009). Structural equation modeling in management research: A guide for improved analysis. *The Academy of Management Annals, 3,* 543-604. doi:10.1080/19416520903065683

SR 5:
Chan, D. (1998). The conceptualization and analysis of change over time: An integrative approach incorporating longitudinal mean and covariance structures analysis (LMACS) and multiple indicator latent growth modeling (MLGM). *Organizational Research Methods, 1*, 421-483. doi:10.1177/109442819814004

SR 6:
Chan, D. (2002). Latent growth modeling. In F. Drasgow & N. Schmitt (Eds.), *Measuring and analyzing behavior in organizations: Advances in measurement and data analysis* (pp. 302-349). San Francisco, CA: Jossey-Bass.

SR 7:
Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational Research Methods*, *3*, 4-70. doi: 10.1177/109442810031002

SR 8:
Cheung, G. W., & Lau, R. S. (2012). A direct comparison approach for testing measurement invariance. *Organizational Research Methods*, *15*, 167-198. doi:10.1177/1094428111421987

SR 9:
Lau, R. S., & Cheung, G. W. (2012). Estimating and comparing specific mediation effects in complex latent variable models. *Organizational Research Methods*, *15*, 3-16. doi:10.1177/1094428110391673

SR 10:

Cheung, G. W., & Lau, R. S. (in press). Accuracy of parameter estimates and confidence intervals in moderated mediation models: A comparison of regression and latent moderated structural equations. *Organizational Research Methods*. doi:10.1177/1094428115595869

SR 11:

Kahn, J. H. (2011). Multilevel modeling: Overview and applications to research in counseling psychology. *Journal of Counseling Psychology*, *58*, 257-271. doi:10.1037/a0022680

SR 12:

Nezlek, J. B. (2008). An introduction to multilevel modeling for social and personality psychology. *Social and Personality Psychology Compass*, *2*, 842-860. doi:10.1111/j.1751-9004.2007.00059.x

SR 13:

Marsh, H. W., Morin, A. J. S., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology*, *10*, 85-110. doi:10.1146/annurev-clinpsy-032813-153700

SR 14:

Morin, A. J. S., Arens, A. K., & Marsh, H. W. (2015). A bifactor exploratory structural equation modeling framework for the identification of distinct sources of construct-relevant psychometric multidimensionality. *Structural Equation Modeling*, 23, 116-139. doi:10.1080/10705511.2014.961800

SR 15:

Marsh, H. W., Ludtke, O., Trautwein, U., & Morin, A. J. S. (2009). Classical latent profile analysis of academic self-concept dimensions: synergy of person- and variable-centered approaches to theoretical models of self-concept. *Structural Equation Modeling*, *16*, 191-225. doi:10.1080/10705510902751010

SR 16:

Pastor, D. A., Barron, K. E., Miller, B. J., & Davis, S. L. (2007). A latent profile analysis of college students' achievement goal orientation. *Contemporary Educational Psychology*, *32*, 8-47. doi:10.1016/j.cedpsych.2006.10.003