COMM 801: Advanced Research Methods in Communication
offered Fall 2009 as

Applied Structural Equation Modeling

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Class Time: Tuesday and Thursday, 4:30 to 6:18, Journalism 342
Office Hours: Stop by my office at your convenience, or call or email for an appointment

Purpose of the Course

This graduate course overviews the application of structural equation modeling to various analysis problems confronted throughout the social, behavioral, and health sciences. Topics will include confirmatory factor analysis, measurement and structural models, path analysis, mediation, latent growth modeling, assessing model fit, and implementation of methods in statistical software.

Required Course Readings

1. Kline, R. B. (2005). *Principles and practice of structural equation modeling* (2nd Ed). *New York: Guilford Press*.

2. Byrne, B. B. (2010). *Structural equation modeling using AMOS. Basic concepts, applications, and programming* (2nd Ed). New York: Routledge.

3. Muthén, L. K., & Muthén, B. O. (1998-2007). *Mplus User's Guide* (5th Ed). Los Angeles, CA: Muthén & Muthén.

4. Assorted readings in PDF on CARMEN

   Kline and Byrne can be purchased at OSU Barnes and Noble or through any online retailer. A copy of Muthén and Muthén will be checked out to each student at the beginning of the quarter. It can also be downloaded from http://www.statmodel.com.

Required Software

All students have access to SPSS 17 and AMOS 17 through an OSU site license (Note: SPSS is now being called "PASW Statistics", although I will probably stick to the old name). You should secure a copy of these two programs, as you will need both. For details on how to obtain see http://oit.osu.edu/site_license/slwin.html#spss. We will also learn about Mplus in this class, and 20 machines in JR342 have Mplus installed. Students in the School of Communication should already have a copy installed in their office. Although the program is expensive ($595

for the base module), students can obtain a copy of the program for $195. I recommend that if you are going to get serious about data analysis, you purchase a copy of Mplus. See http://www.statmodel.com, where information about student pricing is available. A demo copy of Mplus can be downloaded for free, but it will not be able to handle most of the more complex models we discuss in this class.

Structure and Philosophy of the Course

The course is structured like a workshop. The required books for the course are a mixture of technical and applied material. I do not expect you to understand all the technical material, and most of what you will find in the books and readings will not be discussed in class. My approach will be to familiarize you with some applications of structural equation modeling and give you some direct experiencing using various software packages to estimate the models. After this class, you will not be an expert on the topic. In fact, far from it, you will learn just enough in this class to make you dangerous, for there is much more to structural equation modeling than knowing how to set up a model and clicking the right button on a computer. I assume that you will use this introduction as a springboard to more advanced understanding as you progress through your education and your life as a scholar and scientist.

Policies

Attendance. As a Ph.D.-seminar, attendance is always expected, but always optional. It is difficult to imagine you will benefit much from a class you frequently don't attend, but the choice to attend or not is yours to make. I appreciate that we are all busy, and sometimes we lose track of time. Nevertheless, please do your best to be on time to class, and I will do the same. Given the recent concerns about the H1N1 virus, it is probably best that you stay home if you feel you may be suffering from the flu. Although there is no substitute to attending lectures, materials will be made available on CARMEN.

Academic Misconduct. All students at Ohio State University are bound by the Code of Student Conduct (see http://studentaffairs.osu.edu/resource_csc.asp). Violations of this code in this class, especially pertaining to 3335-23-04 Section A on Academic Misconduct, will be aggressively prosecuted through the procedures the university has set up to deal with violations of the Code. If I believe you have violated the Student Code, your case will be referred to the Committee on Academic Misconduct (see http://oaa.osu.edu/coam/home.html). Make sure that you are understand the Code of Student Conduct, and familiarize yourself with "Ten Suggestions for Preserving Academic Integrity" available online at http://oaa.osu.edu/coam/ten-suggestions.html. The standard penalty given to a graduate student found guilty in violation of 3335-23-04 Section A is failure in the course and suspension from the university. In the School of Communication, a graduate student found in violation of the Code of Student Conduct will likely also have his or her funding revoked permanently. Repeat offenses and especially egregious violations of the Code can and often do result in dismissal from the University. I serve on the University Committee on Academic

Misconduct. I know how it works, and it is not fun to sit in front of a panel of faculty and fellow students and defend your actions, especially when they are indefensible. Graduate students who violated the code of student conduct are given very little leniency by the committee. At a minimum you will be suspended from the university, even for a first time offense.

Tentative Nature of this Syllabus. This syllabus represents a contract in the works. Events that transpire over the quarter may, in rare circumstances, require me to modify the administration of this course and therefore the syllabus. In the event I need to modify the syllabus, I will announce the modification in class and on CARMEN. Ultimately, it is your responsibility to keep up with any such modifications and be aware of current policies, deadlines, etc.

Students with Special Needs. If you need an accommodation based on the impact of a disability, you should contact me to arrange an appointment as soon as possible. At the appointment we can discuss the course format, anticipate your needs and explore potential accommodations. I rely on the Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you have not previously contacted the Office for Disability Services, I encourage you to do so.

Emergencies. In the event of an emergency, please carefully follow the directions of the teaching staff or, if deemed prudent by your own judgment, contact 911 or the University Police at 292-2121

Inclement Weather/"Absent Professor". Unless the university is closed, you should always assume class will be held. I have no plans to cancel any class this quarter (even during NCA and MAPOR). But I can't eliminate the possibility that I may not be able to make it to a lecture as a result of some unforeseen circumstance. If I do not show up within **30** minutes after the scheduled start of class, then consider the class cancelled.

Evaluation

Although classes are important, my belief is that the most important time in graduate school is spent conducting research and writing about it. Thus, your grade will not be based on your attendance or participation or the completion of assignments or other 'busy work'. Instead, your grade will be based entirely on a data analysis project that you complete using either your own data or data available to you through an advisor or through a public archive. You should write this paper as if you were planning on submitting it to an academic conference or journal. This assignment is detailed on a separate handout. The paper is due on the day the registrar has scheduled the final exam, which is Monday December 7th at 3:30PM. Your project will be graded on a scale from 0 to 100. The project must be completed independently, without consulting with other students when it is being prepared. If I am suspicious that you have violated this rule, I will turn all relevant material to the Committee on Academic Misconduct for investigation.

Your grade will be calculated based on the following grading scale: 92+ = A; 89-91: A-; 82-88 = B+; 75-81 = B; 70-74 = B-; 65-69 = C+; 60-64 = C; 50-59 = C-; 45-49 = D+; 40-45 = D; <40 = E. I do not "curve" my grading. Everyone could receive an A, although history shows that about 1/3rd of students in my advanced classes get an A or A-, one half receive a B+ or B, and the rest get a B- or less.

Schedule of Lectures and Readings

Rather than schedule specific days for specific topics, we will work through the material at whatever pace seems most comfortable for the class as a whole. You will be told when we are advancing to the next unit in the class prior to starting material in that unit so that you can read all required readings prior to class.

Unit I: Regression refresher, basic concepts, use of software

This unit includes a review of basic concepts in correlation and regression, overviews some of the applications and vocabulary of SEM we will discuss in this class, and introduces the use of AMOS and Mplus software for model estimation.

Required Reading:
Barbara Byrne, Chapters 1 and 2
Rex Kline, Chapters 1 through 4

Optional but recommended reading
Hayes, A. F. (2005). *Statistical methods for communication science* (Chapter s 12 and 13). Mahwah, NJ: Lawrence Erlbaum Associates.
Weston, R., Gore, P. A., Chan, F., & Catalano, D. (2008). An introduction to using structural equation models in rehabilitation psychology. *Rehabilitation Psychology, 53*, 340-356.

Unit II: Path analysis with observed variables

Required Reading
Rex Kline, Chapters 5 and 6
MacCallum, R. C., Wegener, D. T., Uchino, B. N., & Fabrigar, L. R. (1993). The problem of equivalent models in applications of covariance structure analysis. *Psychological Bulletin, 114*, 195-199.
MacCallum, R. C., Roznowski, M., & Necowitz, L. B. (1992). Model modifications in covariance structure analysis: The problem of capitalization on chance. *Psychological Bulletin, 111*, 490-504.

Optional but recommended reading
Hayes, A. F. (in press). Beyond Baron and Kenny: Statistical mediation analysis in the new millennium. *Communication Monographs*.

Preacher, A.F., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879-891.

Unit III: Measurement, exploratory, and confirmatory factor analysis

This unit focuses on fundamental concepts of measurement and the development and testing of measurement models using exploratory and confirmatory approaches.

Required Reading

Kline, Chapter 7

Barbara Byrne, Chapters 3 and 4

Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment, 7*, 286-299.

Schmitt, N. (1996). Uses and abuses of coefficient alpha. *Psychological Assesment, 8*, 350-353.

Streiner, D. L. (2003). Starting at the beginning: An introduction to coefficient alpha and internal consistency. *Journal of Personality Assessment. 80*, 99-103.

Streiner, D. L. (2003). Being inconsistent about consistency: When coefficient alpha does and doesn't matter. *Journal of Personality Assessment, 80*, 217-222.

Optional but ecommended reading

Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin, 110*, 305-314.

Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology, 78*, 98-104.

Fabrigar, L. R., Wegener, D. T., MacCallum, R. C., & Strahan, E. J. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4*, 272-299.

Hayton, J. C., Allen, D. G., Scarpello, V. (2004). Factor retention decisions in exploratory factor analysis: A tutorial on parallel analysis. *Organizational Research Methods, 7*, 191-205.

Henson, R. K., & Roberts, J. K. (2006). Use of exploratory factor analysis in published research: Common errors and some comment on improved practice. *Educational and Psychological Measurement, 66*, 393-416.

Jackson, D. L., Gillaspy, J. A., Purc-Stephenson, R. (2009). Reporting practices in confirmatory factor analysis: An overview and some recommendations. *Psychological Methods, 14*, 6-23.

Unit IV: Structural models with latent variables

This unit merges Units II and III by discussing the estimation of models that include both measurement models for latent variables and structural paths linking latent and observed variables together into a unified model.

Required Reading

Barbara Byrne, Chapter 6

Rex Kline, Chapter 8

Unit V: Latent growth models

This unit describes this SEM-based approach to modeling change over time in longitudinal data.

Required Reading
Rex Kline, Chapter 10
Barbara Byrne, Chapter 11
Byrne, B. M., & Crombie, G. (2003). Modeling and testing change: An introduction to latent growth curve modeling. *Understanding Statistics, 2*, 177-203.

Optional but recommended reading:
Preacher, K. J., Wichman, A. L., MacCallum, R. C., & Briggs, N. E. (2008). *Latent growth curve modeling*. Thousand Oaks, CA: Sage Publications

Unit VI: Multiple group models (pending time available)

This unit introduces the means of formally comparing model parameters between independent groups, used for testing hypotheses about group differences in processes or measurement.

Required Reading
Barbara Byrne, Chapters 7 and 9
Rex Kline, Chapter 11

Administrative Notes