

COMM 801: Advanced Research Methods in Communication

Autumn 2006: "Applied Intermediate and Advanced Linear Models"

JR 342 MW 3:30 to 5:18

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Course Description

This is a doctoral course in intermediate and advanced topics in linear models. The course will be divided into 4 content units, including advanced issues in regression, dichotomous and ordered outcome models, multilevel models, and path analysis/structural equation modeling. We will devote roughly 5 class meetings to each unit. Emphasis will be on conceptual understanding and the use of statistical software such as SPSS, HLM, and AMOS, and interpretation of output rather than mathematical derivations. The only prerequisite to this course is a solid introduction to multiple regression, obtained through such courses as COMM 790, PSYCH 828, SOCIO 649, or an equivalent course offered elsewhere. Students needing a quick refresher are encouraged to review Chapters 12 through 16 of Hayes, A. F. (2005). *Statistical methods for communication science*. Mahwah, NJ: Erlbaum. (Chapters 12 and 13 can be downloaded from CARMEN).

Readings

The readings for the course will consist of three small books available for purchase at the OSU bookstore [B] as well as various readings that can be obtained in electronic format through CARMEN. All readings are required, but we will not touch on all topics in the readings, and you are not expected to understand and master everything you read in this course. The most important material will be covered during the lectures. The rest is important but supplementary, for your own benefit and intellectual growth. Additional readings may be added to this list as the quarter progresses.

Unit I: The Linear Model and Its Assumptions

Berry, W. D. (1993). *Understanding regression assumptions*. Thousand Oaks, CA: Sage [B]

Hayes, A. F., & Cai, L. (in press). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*.

Downs, G. W., & Roche, D. M. (1979). Interpreting heteroscedasticity. *American Journal of Political Science*, 23, 816-828.

Perry, D. K. (1986). Looking for heteroscedasticity: A means of searching for neglected conditional relationships. In M. L. McLaughlin (Ed), *Communication Yearbook*, 9, 658-670.

McClendon, M. J. (1994). *Multiple regression and causal analysis [Chapters 6 & 7: Nonlinear relationships; Nonadditive relationships]*. Itasca, IL: Peacock Publishers.

Unit II: Modeling Dichotomous and Ordinal Outcomes

O'Connell, A. A. (2006). *Logistic regression models for ordinal response variables*. Thousand Oaks, CA: Sage Publications [B]

Lottes, I. L., Adler, M. A., & DeMaris, A (1996). Using and interpreting logistic regression: A guide for teachers and students. *Teaching Sociology*, 24, 284-298.

Scott, S. C., Goldberg, M. S., & Mayo, N. E. (1997). Statistical assessment of ordinal outcomes in comparative studies. *Journal of Clinical Epidemiology*, 50, 45-55.

Unit III: Multilevel Modeling

Luke, D. (2004). *Multilevel modeling*. Thousand Oaks, CA: Sage Publications [B]

Bliese, P. D., & Hanges, P. J. (2004). Being both too liberal and too conservative: The perils of treating grouped data as though they were independent. *Organizational Research Methods*, 7, 400-417.

Davison, M. L., Kwak, N., Seo, Y. S., & Choi, J. (2002). Using hierarchical linear models to examine moderator effects: Person by organization interactions. *Organizational Research Methods*, 5, 231-254.

Peugh, J. L., & Enders, C. K. (2005). Using the SPSS MIXED procedure to fit crosssectional and longitudinal multilevel models. *Educational and Psychological Measurement*, 65, 717-741.

Unit IV: Path Analysis and Structural Equation Modeling

Byrne, B. M. (2001). *Structural equation modeling with AMOS [Chapter 1: Structural equation models: The basics]*. Mahwah, NJ: Lawrence Erlbaum

Klem, L. (2000). Structural equation modeling. In L. G. Grimm and P. R. Yarnold (Eds.), *Reading and understanding more multivariate statistics*. Washington, DC: American Psychological Association.

Kline, R. B. (1998). *Principles and practice of structural equation modeling [Chapter 5: Structural models with observed variables and path analysis: I. Fundamentals]*. New York: Guilford Press.

Kline, R. B. (1998). *Principles and practice of structural equation modeling [Chapter 9: How to fool yourself with SEM]*. New York: Guilford Press.

Preacher, K. J., & Hayes, A. F. (in preparation). Mediation and the estimating and testing of indirect effects in communication research. In A. Hayes, M. Slater, & L. Snyder (Eds.), *The Sage guide to advanced data-analysis methods for communication research*. Thousand Oaks, CA: Sage University Press.

Evaluation

At the end of each topic area you will given an assignment to complete, due one week after it is distributed. There will be four assignments in total, the fourth being due on the day of the final exam. There are no exams in this course. Each assignment will be worth 25% of your grade.

Derivation of Final Grade

My grading system is largely a percentage-based system, where 90% = A, 80% = B, 70% = C, 60% = D, <60% = E, and +/- determinations are based on proximity of your % to the cutoffs. I reserve the right to modify this system downward depending on the distribution of grades. In other words, if only 1 student exceeds the 90% criterion but 5 hit 89%, I may choose to move the A cutoff down to 89%.

Policies and Miscellaneous

Late or Absent Assignments and Missed Exams

Unless otherwise notified, assignments are due by the beginning of class on the date due. An assignment will not be accepted more than two days after the due date. The only exceptions to these rules are tragic, extraordinary, and totally unforeseen personal circumstances that are convincingly **documented** no later than 24 hours after the due date.

Attendance

There is no formal attendance policy for this course. However, you are expected to attend always. If I believe attendance is slipping, I reserve the right to create an attendance policy. Not attending class is a very, very bad idea, as some of the examined material will be presented only during lecture, and most of the skills you will acquire using the computer are not documented anywhere in course materials.

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>) Penalties for academic misconduct are stiff and are almost certain to include failure in this course, revocation of funding, and potentially expulsion from the graduate program. Repeat offenses and especially egregious violations of the Code usually result in suspension or expulsion from the University. Make sure that you are familiar with 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>.

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.

Mathematics Anxiety

This is a graduate-level course pitched at the doctoral level. You will probably find yourself working harder in this course than you have in others in your graduate career. It is fast-paced, and it is intense, and I cannot take time during class to review material you should already know. Strong performance in a solid course in multiple regression is a prerequisite, and it is unlikely you will do well in this course if you aren't comfortable with fundamental statistical principles. However, this is not a mathematical statistics course, so the level of math will be fairly rudimentary in comparison to how similar courses are taught elsewhere. You should be comfortable with basic mathematical operations through high school algebra and be prepared to think analytically and quantitatively.

Schedule of Lectures and Readings

The schedule below is tentative. Topics, readings, and timing will likely vary somewhat from this schedule as progress is made through the material. You are encouraged to read everything more than once and/or to read ahead to enhance your learning and retention. I strongly discourage you waiting to start the reading until after we've covered the material in class. I provide this rough outline so that you can sequence your reading to be consistent with the order of material presented during lectures. If there is no reading listed for a given day, reread the readings for the prior class.

Unit I: Advanced Topics in OLS regression

- 9/20 Course overview and review of OLS regression concepts
- 9/25 OLS review (continued), regression assumptions (Berry, through page 60)
- 9/27 Nonnormality and Nonlinearity (Berry, pp. 60-66; p. 81-82; McClendon, Ch 6)
- 10/2 Nonlinearity (continued); Heteroscedasticity (Berry, pp. 67-81; Hayes & Cai; Downs & Rocke)
- 10/4 heteroscedasticity and multiplicative models (Perry; McClendon, Ch 7)

Unit II: Dichotomous and Ordinal Outcomes

- 10/9 Logistic regression (O'Connell, through page 26; Lottes, Adler, & DeMaris)
- 10/11 Logistic regression (continued)
- 10/16 Ordinal outcomes (O'Connell, p. 27-49; Scott, Goldberg, & Mayo)
- 10/18 Ordinal outcomes (continued)
- 10/23 Multiplicative models

Unit III: Multilevel Modeling

- 10/25 Multilevel modeling concepts, introduction to HLM (Luke, 1-7; Bliese & Hanges)
- 10/30 Basic models in SPSS and HLM (Luke, pp. 9-53; Peugh & Enders)
- 11/1 Basic models in SPSS and HLM (continued)
- 11/6 Cross-level interactions in multilevel models (Davison et al)
- 11/8 Introduction to longitudinal models (we will cut this if need be to catch up; Luke, pp. 62-72)

Unit IV: Structural equation modeling

- 11/13 Basic concepts, Introduction to AMOS (Byrne; Klem; Amos Tutorial)
- 11/15 Path analysis (Kline, Ch 5)
- 11/20 Path analysis (continued) (Preacher & Hayes)
- 11/22 Open discussion prior to break
- 11/27 Measurement models (reading TBA)
- 11/29 Hybrid models, caveats (if time available) (Kline, Ch 9)