HRM: 16:545:613 **Research Methods in IRHR:**
Spring 2009 **Multivariate Analysis**

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Lecture:	Wednesday	1:30 pm – 4:10 pm	106 Levin
Lab (Specific Days TBA):	Wednesday	1:30 pm – 4:10 pm	004 Levin

Course Description:
This course is designed to help you to effectively apply, interpret, and evaluate different multivariate statistical techniques. Throughout the course there will be an emphasis on both conceptual understanding and the development of practical "how-to" skills. Topics covered in the sequence are organized in terms of complexity, beginning with a broad overview, moving into regression, and ending with structural equation modeling.

Traditionally, our discipline has made use of an unusually broad range of methods and analytical strategies to address questions of interest. Because each approach to answering research questions involves trade-offs, researchers have often found it necessary to employ a combination of analytical techniques to reach any firm conclusions. A major goal of this course is to facilitate decision making within these constraints.

If your goal is to do quality work, whether you are in a research or applied domain, then you will need tools to help you make sense of your data or of the effectiveness of your chosen approach to a problem. We will discuss a variety of advanced statistical tools, examining the pros, cons, and assumptions associated with each. You will be exposed to tests for violations of regression assumptions, mediation and moderation in regression, regression with categorical independent variables, regression with dichotomous variables, MANOVA/discriminant analysis, factor analysis, path analysis, structural equation modeling, and hierarchical linear modeling.

Throughout the semester, you will gain hands-on experience through a number of different projects and learn how to draw statistical and substantive conclusions from the results of various analyses. You will be asked to prepare written summaries of results using either APA or Academy of Management style. These are common publication formats for journals germane to our field.

Grades:
Course Requirements:
The course requirements for this semester include: (1) attendance at sessions; (2) a series of project assignments and brief write-ups of the results in appropriate format; (3) midterm exam; (4) final exam.

Grades are determined as follows:
42% Evaluation of the assigned projects (6% each)
25% Midterm exam (in class)
25% Final exam (take home)
8% Attendance/participation

Final grades: A(90%); B(80%); C(70%); D(60%); F(below 60%)

Each new topic builds on previous material, so it is important that you try to remain current throughout the course. All of you are encouraged to work together, preparing for exams and discussing projects. However, all exams and assignments are to be conducted and written individually.

You will find the required reading list attached to this syllabus. Required texts are available at the bookstore. Other readings will be made available for individual copying. Please note that the readings listed in the course outline are to be read before the next class.

Notes:

1. Although I believe in making myself accessible, I cannot engage in one-on-one tutoring if you miss class.
2. I would like to maintain flexibility and understanding of your work and life schedules. However, I would like people to meet the expected deadlines. Please speak to me privately if you have an unusual circumstance that would require some alternative arrangement.
3. You are encouraged to work together throughout the class, However, it should be noted that academic integrity, as outlined in the SMLR handbook (pp. 24-25), is a requirement of this course.

Required Materials:

Texts:

K Kennedy, P. (2008). A guide to econometrics (6th edition). Wiley-Blackwell.

TF Tabachnick, B. G., & Fidell, L. S. (2006). Using multivariate statistics (5th edition). Boston, MA: Allyn and Bacon.

Recommended Materials

Academy of Management Journal Style Guide.
http://journals.aomonline.org/amj/style_guide.html

Academy of Management Review Style Guide.
http://journals.aomonline.org/amr/style.html

American Psychological Association. (2001). Publication manual (5th edition). Washington, D. C.: American Psychological Association.

You can find the Command Syntax Reference Guide for SPSS under Help when you have started SPSS.

Overview of Topics:
This course is a dynamic process, **subject to change**. You are responsible for maintaining awareness of changes in class scheduling if you have missed class.

Date	Topic
1/21	Course introduction & overview, review
1/28	Simple & multiple regression; interpretation & model testing; qualitative independent variables
	Project 1 Assigned
2/4	Regression: Mediation
	Project 2 Assigned
	Project 1 Due
2/11	Regression: Moderation (interactions), curvilinearity
2/18	Regression: Assumptions, Diagnostics
	Project 3 Assigned
	Project 2 Due
2/25	Regression: Dichotomous Dependent Variables
	Project 4 Assigned
3/4	MANOVA/Discriminant Analysis
	Project 3 Due
3/11	Repeated measures
3/18	***Spring Break***
3/25	**Exam 1 – In class (no take home)**
	Project 4 Due
4/1	Factor Analysis
	Project 5 Assigned
4/8	Path Analysis / Structural Equation Modeling Part I
	Project 6 Assigned
4/15	Structural Equation Modeling Part II
	Project 5 Due
4/22	Levels of analysis / Hierarchical linear modeling Part I
	Project 7 Assigned
	Project 6 Due
4/29	Hierarchical linear modeling / Part II
	Project 7 Due
	Take Home Final Exam
5/6	**Take Home Final Exam Due by Midnight.**
	Articles from Literature Search for Extra Credit Due

Readings

Course introduction & overview, review

Required Books

K: Ch 1-2, Appendix A

T&F: Ch 1-4, Appendix A

Required Articles

Academy of Management Journal Style Guide. http://aom.pace.edu/amjnew/style_guide.html

Academy of Management Review Style Guide. http://aom.pace.edu/AMR/style.htm

American Psychological Association. (1994). Publication manual (4th edition). Washington, D. C.: American Psychological Association. Selected pages.

Gully, S. (1993). Surviving the thesis/dissertation process. The Industrial-Organizational Psychologist, 31, 95-98.

Hinkin, T.R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. Organizational Research Methods, 1, 104-121.

McDonald, R. A., Thurston, P. W., & Nelson, M. R. (2000). A Monte Carlo study of missing item methods. Organizational Research Methods, 3, 71-92.

Roth, P. L., Switzer, F. S., III, & Switzer, D. (1999). Missing data in multiple item scales: A Monte Carlo analysis of missing data techniques. Organizational Research Methods, 2, 211-232.

Smith, P. C., Budzeika, K. A., Edwards, N. A., Johnson, S.M., & Bearse, L. N. (1986). Guidelines for clean data: Detection of common mistakes. Journal of Applied Psychology, 71, 457-460.

Wanous, J. P., & Hudy, M. J. (2001). Single-item reliability: A replicaiton and extension. Organizational Research Methods, 4, 361-375.

Optional But Recommended:

Allison, R. D. (2001). Missing data. Newbury Park, CA: Sage.

Little, R. J. A., & Rubin, D. B. (2002). Statistical analysis with missing data (2nd edition). Wiley.

McCall, M. W., Jr., & Bobko, P. (1990). Research methods in the service of discovery. In M. D. Dunnette and L. M. Hough (Eds.), Handbook of Industrial and Organizational Psychology (2nd ed., vol. 1, pp. 381-418). Palo Alto, CA: Consulting Psychologists Press.

Platt, J. R. (1964). Strong inference. Science, 146, 347-353.

Simple & multiple regression, interpretation & model testing

Required Books

K: Ch. 3-4

T&F: Ch. 5

Required Articles

St. John, C. H., & Roth, P. L. (1999). The impact of cross-validation adjustments on estimates of effect size in business policy and strategy research. Organizational Research Methods, 2, 157-174.

Maxwell, S. E., & Delaney, H. D. (1993). Bivariate median splits and spurious statistical significance. Psychological Bulletin, 113, 181-190.

Regression: Qualitative independent variables

Required Books:

K: Ch. 14

T&F: Ch. 6

Required Articles:

Pedhazur, E. J., & Schmelkin, L. P. (1991). Measurement, design, and analysis: An integrated approach (Ch 19, pp. 464-503; Ch 20, pp. 504-544). Hillsdale, NJ: Lawrence Erlbaum.

Optional But Recommended:

Darlington, R. B. (1968). Multiple regression in psychological research and practice. Psychological Bulletin, 69, 161-182.

Regression: Mediation

Required Articles:

Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51, 1173-1182.

James, L. R., & Brett, J. M. (1984). Mediators, moderators, and tests for mediation. Journal of Applied Psychology, 69, 307-321.

MacKinnon, D. P., Fairchild, A. J., & Fritz, M. S. (2007). Mediation analysis. Annual Review of Psychology, 58: 593-614.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. Psychological Methods, 7, 83-104.

Mathieu, J. E., DeShon, R. P., & Bergh, D. D. (2008). Mediational inferences in organizational research: Then, now, and beyond. Organizational Research Methods, 11: 203-223.

Optional But Recommended:

ORM papers, 2008, issue 11

Regression: Moderation (interactions), curvilinearity

Required Articles:

Aguinis, H., & Stone, E. F. (1997). Methodological artifacts in moderated multiple regression and their effects on statistical power. Journal of Applied Psychology, 82, 192-206.

Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions (Ch. 2-4, pp. 9-61; Ch. 7, pp. 116-138). Newbury Park, CA: Sage.

Cohen, J. (1978). Partialed products are interactions; partialed powers are curve components. Psychological Bulletin, 85, 858-866.

Cortina, J. (1993). Interaction, nonlinearity, and multicollinearity: Implications for multiple regression. Journal of Management, 19, 915-922.

Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. Journal of Personality and Social Psychology, 89, 852-863.

Optional But Recommended:

Aguinis, H. (1995). Statistical power problems with moderated multiple regression in management research. Journal of Management, 21, 1141-1158.

Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions. Newbury Park, CA: Sage.

Cohen, J., & Cohen, P. (1983). Applied multiple regression/correlation analysis for the behavioral sciences (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum.

Jaccard, J. J., Turrisi, R., & Wan, C. K. (1990). Interaction effects in multiple regression. Sage University Paper series on Quantitative Applications in the Social Sciences, 07-072. Newbury Park, CA: Sage.

Regression: Assumptions, Diagnostics

Required Books:

K: Ch. 5-11

Required Articles:

Dillon, W. R., & Goldstein, M. (1984). Multivariate analysis: Methods and applications (pp. 293-301). NY: Wiley.

Foster, E. M., & McLanahan, S. (1996). An illustration of the use of instrumental variables: Do neighborhood conditions affect a young person's chance of finishing high school? Psychological Methods, 1, 249-260.

Kruse, D. L. (1993). Profit sharing: Does it make a difference? (pp. 197-224). Kalamazoo, MI: W. E. Upjohn Institute for Employment Research.

Orr, J. M., Sackett, P. R., & Dubois, C. L. Z.(1991). Outlier detection and treatment in I/O psychology: A survey of researcher beliefs and an empirical illustration. Personnel Psychology, 44, 473-486.

Optional But Recommended:

Belsley, D.A., Kuh, E., & Welsch, R.E. (1980). Regression diagnostics: Identifying influential data and sources of collinearity. New York: John Wiley.

Bollen, K.A., & Jackman, R.W. (1990). Regression diagnostics: An expository treatment of outliers and influential cases. In J. Fox, J.S. Long (Eds.), Modern methods of data analysis. Newbury Park, CA: Sage.

Cook, R.D., & Weisberg, S. (1994). An introduction to regression graphics. New York: Wiley.

Fox, J. (1991). Regression diagnostics. Newbury Park, CA: Sage.

Rozeboom, W. W. (1979). Ridge regression: Bonanza or beguilement? Psychological Bulletin, 86, 242-249.

Tzelgov, J., & Henik, A. (1991). Suppression situations in psychological research: Definitions, implications, and applications. Psychological Bulletin, 109, 524-536.

Regression: Dichotomous Dependent Variables

Required Books:

K: Ch. 15-16

T&F: Ch. 10

Required Articles:

Huselid, M. A., & Day, N. E. (1991). Organizational commitment, job involvement, and turnover: A substantive and methodological analysis. Journal of Applied Psychology, 76, 380-391.

Optional But Recommended:

Hosmer, D. W., & Lemeshow, S. (1989). Applied Logistic Regression. NY: Wiley.

Long, J.S. (1997). Regression models for categorical and limited dependent variables. Thousand Oaks, CA: Sage.

MANOVA/Discriminant Analysis

Required Books:

T&F: Ch. 7, 9

Required Articles:

Bobko, P. (1990). Multivariate correlational analysis. In M. D. Dunnette and L. M. Hough (Eds.), Handbook of industrial and organizational psychology (2nd ed., Vol. 1, pp. 637-686). Palo Alto, CA: Consulting Psychologists Press.

Optional But Recommended:

Betz, N. E. (1987). Use of discriminant analysis in counseling psychology research. Journal of Counseling Psychology, 34, 393-403.

Conlon, D. E., Porter, C. O. L. H., & Parks, J. M. (2004). The fairness of decision rules. Journal of Management, 30(3), 329–349. (MANOVA)

Denison, D. R., Hart, S. L., & Kahn, J. A. (1996). From chimneys to cross-functional. teams: Developing and validating a diagnostic model. Academy of Management Journal, 39(4), 1005-1023. (EFA/CFA)

Haase, R. F., & Ellis, M. V. (1987). Multivariate analysis of variance. Journal of Counseling Psychology, 34, 393-403.

Jobson, J. D. & Schneck, R. E. (1982). Constituent views of organizational effectiveness: Evidence form police organizations. Academy of Management Journal, 25, 25-46. (EFA)

Lepak, D. P., & Snell, S. A. (2002). Examining the human resource architecture: The relationships among human capital, employment, and human resource configurations. Journal of Management, 28(4), 517–543. (MANCOVA)s

Ramanujam, V., Venkatraman, N., & Camillus, J. C. (1986). Multi-objective assessment of effectiveness of strategic planning: A discriminant analysis approach. Academy of Management Journal, 29(2), 347-372. (DA)

Repeated measures

Required Books:

K: Ch. 18

T&F: Ch. 8

Required Articles:

O'Brien, R.G., & Kaiser, M.K. (1985). MANOVA method for analyzing repeated measures designs: An extensive primer. Psychological Bulletin, 97, 316-333.

Optional But Recommended:

Ballinger, G. A. Using generalized estimating equations for longitudinal data analysis. Organizational Research Methods, 7: 127-150.

Huynh, H., & Mandeville, G. K. (1979). Validity conditions in repeated measures designs. Psychological Bulletin, 86, 964-973.

Rogan, J.C., Keselman, H.J., & Mendoza, J.L. (1979). Analysis of repeated measurements. British Journal of Mathematical and Statistical Psychology, 32, 269-286.

Principal Components and Factor Analysis

Required Books:

T&F: Ch. 13

Required Articles:

Conway J. M., & Huffcutt A.I. (2003). A review and evaluation of exploratory factor analysis practices in organizational research. Organizational Research Methods, 6, 147-168.

Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. Personnel Psychology, 39, 291-314.

Optional But Recommended:

Gorsuch, R. L. (1988). Exploratory factor analysis. In J. R. Nesselroade and R. B. Cattel (Eds.), Handbook of multivariate experimental psychology (2nd ed., pp. 231-258). New York: Plenum Press.

Path analysis

Required Articles:

Handout from Gully

James, L. R. (1980). The unmeasured variables problem in path analysis. Journal of Applied Psychology, 65(4), 415-421.

Pedhazur, E. J. (1982). Multiple regression in behavioral science: Explanation and prediction (2nd ed., pp. 577-635). Fort Worth, TX: Holt, Rinehart, & Winston.

Structural Equation Modeling

Required Books:

T&F: Ch. 14

Required Articles:

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice : A review and recommended two-step approach. Psychological Bulletin, 103(3), 411-423.

Bentler, P. M., & Bonnett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin, 88, 588-606.

Cortina, J. M., Chen, G., & Dunlap, W. P. (2001). Testing interaction effects in LISREL: Examination and illustration of available procedures. Organizational Research Methods, 4, 324-360.

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.

McDonald, R. P., & Ho, M. R. (2002). Principles and practice in reporting structural equation analyses. Psychological Methods, 7(1), 64-82.

Optional But Recommended:

Bollen, K.A. (1989). Structural equations with latent variables. NY:Wiley.

Bollen, K.A., & Long, J.S., Eds. (1993). Testing structural equation models. Newbury Park, CA: Sage.

Hayduk, L. A. (1987). Structural equation modeling with LISREL. Baltimore: John Hopkins University Press.

Loehlin, J. C. (1992). Latent variable models: An introduction to factor, path, and structural analysis (2nd ed). Hillsdale, NJ: Lawrence Erlbaum Associates. ISBN: 0-8058-1083-8; 08058 1084-6

MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. Psychological Methods, 1, 130-149.

Marcoulides, G. A. (1998). Modern methods for business research. Hillsdale, NJ: Lawrence Erlbaum Associates. ISBN: 0-8058-2677-7.

Marcoulides, G. A., & Schumaker, R. E., Editors. (1996). Advanced structural equation modeling: Issues and techniques. Mahwah, NJ: Lawrence Erlbaum.

Schumacker, R. E., & Lomax, R. G. (1996). A beginner's guide to structural equation modeling. Mahwah, NJ: Erlbaum.

Viswesvaran, C., & Ones, D.S. (1995). Theory testing: Combining psychometric meta-analysis and structural equation modeling. Personnel Psychology, 48, 865-883.

Levels of Analysis / Hierarchical Linear Modeling

Required Books:

K: Ch. 18

T&F: 15

Required Articles:

Handout from Gully

Hofmann, D. A. (1997). An overview of the logic and rationale of hierarchical linear models. Journal of Management, 23, 723-744.

Hofmann, D. A. & Gavin, M. B. (1998). Centering decisions in hierarchical linear models: Implications for research in organizations. Journal of Management, 24, 623-641.

Klein, K. J., Bliese, P. D., Kozlowski, S. W. J., Dansereau, F., Gavin, M. B., Griffin, M. A., Hofmann, D. A., James, L. R., Yammarino, F. J., & Bligh, M. C. (2000). Multilevel analytical techniques: Commonalities, differences, and continuing questions. In K. J. Klein & S. W. J. Kozlowski (Eds.), Multilevel Theory, Research, and Methods in Organizations. San Francisco: Jossey-Bass.

Klein, K. J., Dansereau, F., & Hall, R. J. (1994). Levels issues in theory development, data collection, and analysis. Academy of Management Review, 19, 195-229.

Klein, K. J., & Kozlowski, S. W. J. (2000). From micro to meso: Critical steps in conceptualizing and conducting multilevel research. Organizational Research Methods, 3, 211-236.

Kozlowski, S. W. J. & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), Multilevel Theory, Research, and Methods in Organizations (pp. 3-90). San Francisco: Jossey-Bass.

Optional But Recommended:

Bryk, A. S., & Raudenbush, S. W. (2002). Hierarchical linear models: Applications and data analysis methods (2nd edition). Newbury Park, CA: Sage.

Bryk, A. S., & Raudenbush, S. W., & Congdon, R. (1994). Hierarchical linear and nonlinear modeling with HLM/2L and HLM/3L programs. Chicago, IL: Scientific Software International.

Deadrick, D. L., Bennet, N. & Russell, C. J. (1997). Using hierarchical linear modeling to examine dynamic performance criteria over time. Journal of Management, 23, 745-757.

Hofmann, D. A., Griffin, M., & Gavin, M. (2000). The application of hierarchical linear modeling to organizational research. In K. J. Klein & S. W. J. Kozlowski (Eds.), Multilevel theory, research and methods in organizations (pp. 467-511). San Francisco, CA: Jossey-Bass.

Hofmann, D. A., Jacobs, R., & Baratta, J. E. (1993). Dynamic criteria and the measurement of change. Journal of Applied Psychology, 78, 194-204.

Meta-Analysis

Handout from Gully
Readings from Hunter & Schmidt, Lipsey & Wilson