



COURSE TITLE/SECTION: SOCW 8326/10137 Advanced Multivariate Statistics

TIME: Monday 9:00 – 12pm

FACULTY: Patrick Leung, Ph.D.

OFFICE HOURS: M 12-1p; Tue 4-5p Room 444 SW

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I. Course

A. Catalog Description

Prerequisite: SOCW 8324 Bio Statistics and doctoral standing in social work. Emphasizes advanced multivariate statistical procedures, including MANOVA, MANCOVA, discriminant analysis, logistic regression, and meta-analysis.

B. Purpose

The purpose of this course is to prepare students to analyze data in a wide variety of research settings. This course will focus on advanced statistical procedures, the assumptions underlying various statistical approaches, as well as a framework for choosing the most appropriate statistic in a given data analysis. Advanced multivariate statistics will be highlighted.

II. Objectives

Upon completion of this course, students will be able to demonstrate the following competencies:

1. Demonstrate an understanding of the relationship between research design and advanced statistical methods in social work research;
2. Demonstrate an understanding of the principles of probability theory in multivariate analysis including Multivariate Analysis of Variance, Multivariate Analysis of Covariance, Discriminant Function Analysis, Logistic Regression, and Meta-analysis;
3. Demonstrate the application of the principles of probability theory to statistical problems related to advanced social work research; and
4. Demonstrate the use of the Statistical Package for Social Sciences to analyze data using advanced multivariate statistical procedures.

III. Course Content

This course is the third required statistics courses in the doctoral curriculum. A topical outline is included with the class schedule and reading assignments in a separate attachment to this syllabus.

IV. Course Structure

The course will be taught using a combination of instructional methods including group and class discussions, lectures, exercises, assigned and recommended readings, and homework assignments. Computer technology for statistical analyses will also be included.

V. Required Texts/Software

Abu-Bader, S. (2010). Advanced and multivariate statistical methods for social work research. Chicago, IL: Lyceum Books, Inc.

Field, A. (2013). Discovering statistics using SPSS (4th ed.). Beverly Hills, CA: Sage Publications.

Grimm, L.G., & Yarnold, P.R.(Eds.). (1995). Reading and understanding multivariate statistics. Washington, D.C.: American Psychological Association.

SPSS, Inc. (2013). SPSS 22.0 for windows brief guide. Chicago, IL: SPSS Inc (or the latest version).

SPSS, Inc. (2013). SPSS for windows graduate pack version, Version 22.0. Chicago, IL: (Author) (or the latest version).

Wolf, F.M. (1986). Meta-analysis: Quantitative methods for research synthesis. Newbury Park, CA: Sage.

RECOMMENDED TEXTS

American Psychological Association. (2009). Publication manual of the American Psychological Association (6th ed.). Washington, DC: Author.

Hedderon, J., & Fisher, M. (1993). SPSS made simple (2nd ed.). Belmont, CA: Wadsworth Publishing Company.

Kim, J.O., & Mueller, C.W. (1979). *Factor analysis*. Beverly Hills, CA: Sage.

Kim, J.O., & Mueller, C.W. (1979). *Introduction to factor analysis*. Beverly Hills, CA: Sage.

Kinneer, P.R., & Gray, C.D. (1999). SPSS for windows made simple (3rd ed). East Sussex UK: Psychology Press, Publishers.

Klecka, W.R. (1980). Discriminant analysis. Beverly Hills, CA: Sage.

Knoke, D., & Burke, P.J. (1980). Log-linear models. Beverly Hills, CA: Sage.

Norusis, J Marija (2000). SPSS 10.0: Guide to data analysis. Upper Saddle River, NJ: Prentice Hall.

Osterlind, S., & Tabachnick, B. (2001). SPSS for Windows workbook to accompany using multivariate statistics. (4th ed.). Boston, MA: Allyn and Bacon.

Tabachnick, B.G., & Fidell, L.S. (2007). Using multivariate statistics (5th ed.). Boston, MA: Allyn and Bacon.

VI. Course Requirements

A. Reading Assignments

Please see Topical Outline and Reading Assignments.

B. Written Assignments

To assist students in completing the learning objectives for this course, there will be three graded homework assignments related to the course content.

C. Final Exam

A final exam will be required of all students to demonstrate their knowledge and competency in multivariate statistical analysis.

D. Class Participation

1. Class Attendance (5%)

One point will be deducted from the final grade for each absence from class. However, a student who is absent from class for more than five times (including both excused and unexcused absence) will be dropped from the course. In the case that the absence is approved by the instructor, half a point will be deducted from the final grade.

2. Class Participation (5%)

Students are expected to participate in class discussions and projects.

VII. Evaluation and Grading

Final course grades will be based on the following distribution:

Sept 29	Homework Assignment #1 Due	20%
Oct. 20th	Homework Assignment #2 Due	20%
Nov. 17th	Homework Assignment #3 Due	20%
Dec. 1st	Final Exam	30%
	Class Participation	5%

The following standard grading scale has been adopted for all courses taught in the college.

A =	96-100% of the points	C+ =	76-79.9%
A- =	92-95.9%	C =	72-75.9%
B+=	88-91.9%	C- =	68-71.9%
B =	84-87.9%	D =	64-67.9%
B- =	80-83.9%	F =	Below 64%

No "incomplete" grades will be given by any instructor without prior permission (excluding an unforeseen emergency) from the instructor.

VIII. Policy on grades of I (Incomplete): The grade of "I" (Incomplete) is a conditional and temporary grade given when students are either **(a)** passing a course or **(b)** still have a reasonable chance of passing in the judgment of the instructor but, for non-academic reasons beyond their control have not completed a relatively small part of all requirements. Students are responsible for informing the instructor immediately of the reasons for not submitting an assignment on time or not taking an examination. Students must contact the instructor of the course in which they receive an "I" grade to make arrangements to complete the course requirements. Students should be instructed not to re-register for the same course in a following semester in order to complete the incomplete requirements.

The grade of "I" must be changed by fulfillment of course requirements within one year of the date awarded or it will be changed automatically to an "F" (or to a "U" [Unsatisfactory] in S/U graded courses). The instructor may require a time period of less than one year to fulfill course requirements and the grade may be changed by the instructor at any time to reflect work complete in the course. The grade of "I" may not be changed to a grade of **W**.

IX. Policy on academic dishonesty and plagiarism

Students are expected to demonstrate and maintain a professional standard of writing in all courses, do one's own work, give credit for the ideas of others, and provide proper citation of source materials. Any student who plagiarizes any part of a paper or assignment or engages in any form of academic dishonesty will receive an "I" for the class with a recommendation that a grade of F be assigned, subsequent to a College hearing, in accordance with the University policy on academic dishonesty. Other actions may also be recommended and/or taken by the College to suspend or expel a student who engages in academic dishonesty.

All papers and written assignments must be fully and properly referenced using APA style format (or as approved by the instructor), with credit given to the authors whose ideas you have used. If you are using direct quotes from a specific author (or authors), you must set the quote in quotation marks or use an

indented quotation form. For all direct quotes, you must include the page number(s) in your text or references. Any time that you use more than four or five consecutive words taken from another author, you must clearly indicate that this is a direct quotation. Please consult the current APA manual for further information.

Academic dishonesty includes using any other person's work and representing it as your own. This includes (but is not limited to) using graded papers from students who have previously taken this course as the basis for your work. It also includes, but is not limited to submitting the same paper to more than one class. If you have any specific questions about plagiarism or academic dishonesty, please raise these questions in class or make an appointment to see instructor. This statement is consistent with the University Policy on Academic Dishonesty that can be found in your UH Student Handbook.

X. Consultation

Individual appointments will be scheduled with any member of the class upon request. The instructor can be reached by calling (713) 743-8111 or contacting him in his office during office hours (Work Building Room 444), or by e-mail at PLEUNG@UH.EDU or by fax at (713) 743-8149.

XI. Americans with Disabilities Statement

Whenever possible, and in accordance with 504/ADA guidelines, the University of Houston will attempt to provide reasonable academic accommodations to students who request and require them. Please call 713-743-5400 for more assistance.

TOPICAL OUTLINE AND READING ASSIGNMENTS

<u>Class Session</u>	<u>Lecture Topic and Readings</u>
August 25 th	Introduction Review of Course Syllabus Review of the Framework for Statistical Analysis Review of MANOVA and MANCOVA Introduction: Discriminant Function Analysis Abu-Bader Ch. 9 Field, Ch.16
September 1	Labor Day (No Class)
September 8 th to September 15 th	Discriminant Function Analysis General Purpose & Description Kinds of Research Questions Limitations Fundamental Equations

Types of Discriminant Function
Important Issues

Grimm & Yarnold, Ch. 9
Field, pp. 654-664

September 22nd to October 6th Meta-analysis

Meta-analysis & Synthesizing Research
Combined Tests
Measures of Effect Size
Examining and Reducing Bias
Nonparametric Methods
Limitations and Strengths
Grimm & Yarnold, Ch. 10
Wolf Chs. 1-6

October 13th to October 27th Logistic Regression

General Purpose & Description
Kinds of Research Questions
Limitations
Types of Logistic Regression
Important Issues

Grimm & Yarnold, Ch. 7
Field, Ch 19
Morrow-Howell, N., & Proctor, E.K. (1992). The use of logistic regression in social work research (to be distributed in class).

November 3rd

Logistic Regression
Fundamental Equations
Types of Logistic Regression
Important Issues

Abu-Bader Ch. 5

November 10th to 24th

Introduction to Factor Analysis
Kinds of Research Questions
Fundamental Concepts of Factor Analysis
Obtaining Factor Analysis Solutions
Some Important Issues
Osterlind & Tabachnick, Ch 13
Grimm & Arnold, Ch 4
Field, Ch 17

December 1st

Final Exam

XII. Bibliography

Statistical Methods: Basic

Balock, H.M., Jr., (1972). *Social statistics* (2nd ed.). New York: McGraw-Hill. *([HA29 .B59 1972](#))

Elifson, K.W., Runyon, R.P., & Haber, A. (1982). *Fundamentals of social statistics*. Reading, MA: Addison-Wesley.

Guilford, J.P., & Fruchter, B. (1978). *Fundamental statistics in psychology and education* (6th ed.). New York: McGraw-Hill.

Healey, J.F. (1984). *Statistics: A tool for social research*. Belmont, CA: Wadsworth.

Hopkins, D.K., Hopkins, B.R., & Glass, G.V. (1996). *Basic statistics for the behavioral sciences*. Boston : Allyn and Bacon. *([HA29 .H734 1996](#))

Kuehl, R.O. (2000). *Design of experiments : Statistical principles of research design and analysis*. Pacific Grove, CA : Duxbury/Thomson Learning. *([Q182.3 .K84 2000](#))

Larsen, R.J., & Marx, M.L. (1981). *An introduction to mathematical statistics and its applications*. Englewood Cliffs, NJ: Prentice-Hall. *([QA276.L314](#))

McPherson, G. (2001). *Applying and interpreting statistics : A comprehensive guide*. New York : Springer. *([Q180.55.S7 M36 2001](#))

MacEachron, A.E. (1982). *Basic statistics in the human services: An applied approach*. Baltimore: university Park Press. *([HA29 .M174 1982](#))

Ohrnstedt, G.W.B., & Knoke, D. (1982). *Statistics for social data analysis*. Itasca, IL: Peacock.

Zeller, R.A., & Carmines, E.G. (1978). *Statistical analysis of social data*. Chicago: Rand McNally.

Multivariate Analysis: General

Baxter, M.J. (1994). *Exploratory multivariate analysis in archaeology*. Edinburgh: Edinburgh University Press. *([CC80.6.B39 1994](#))

Bernstein, I.H., Garbin, C.P., & Teng, G.K. (1988). *Applied multivariate analysis*. New York: Springer-Verlag. *([QA278.B457 1988](#))

Berry, W.D., & Feldman, S. (1985). *Multiple regression in practice*. Beverly Hills, CA: Sage.

Bray, J.H., & Maxwell, S.E. (1985). *Multivariate analysis of variance*. Beverly Hills, CA: Sage.

Bryman, A., & Cramer, D. (1990). *Quantitative data analysis for social sciences*. London: Routledge.

Busch, D.H. (1991). *The new critical path method: CPM: The state-of-the-art in project modeling and time reserve management*. Chicago: Probus Publishing Company. *([TS158.B87 1991](#))

Bryne, B.M. (1989). *A primer of LISREL: Basic applications and programming for confirmatory factor analytic models*. New York: Springer-Verlag. *([HA32 .B97 1989](#))

Carroll, J.D., & Green, P.E. (1997). *Mathematical tools for applied multivariate analysis*. San Diego: Academic Press. *([QA278 .C37 1997](#))

Child, D. (1990). *The essentials of factor analysis* (2^{en} ed.). London: Cassell.

- Christensen, R. (1990). *Log-linear models*. New York: Springer-Verlag. *([QA278.C49 1990](#))
- Cooley, W.W., & Lohnes, R.R. (1971). *Multivariate data analysis*. New York: Wiley. *([QA278.C65](#))
- Crowder, M.J., & Hand, D.J. (1990). *Analysis of repeated measures* (1st ed.). London: Chapman and Hall.
- Dunn, O.J., & Clark, V.A. (1987). *Applied statistics: Analysis of variance and regression* (2nd ed.). New York: Wiley. *([QA279.D87 1987](#))
- Dwyer, J.H. (1983). *Statistical models for the social and behavioral sciences*. New York: Oxford University Press. *([H61.25 .D85 1983](#))
- Edwards, A.L. (1985). *Multiple regression and the analysis of variance and covariance* (2nd ed.). New York: W.H. Freeman. *([BF39.E32 1985](#))
- Everitt, B.S., & Dunn, G. (2001). *Applied multivariate data analysis*. London : Arnold ; New York : Oxford University Press. *([QA278 .E88 2001](#))
- Fang, K., & Zhang, Y. (1990). *Generalized multivariate analysis*. Beijing: Science Press. *([QA278.F35 1990](#))
- Farrell, R.H. (1985). *Multivariate calculation: Use of the continuous groups*. New York: Springer-Verlag.
- Flury, B., & Riedwyl, H. (1988). *Multivariate statistics: A practical approach*. London: Chapman and Hall. (Available at the UH Downtown: [QA278.F58813 1988](#))
- Grimm, L.G., & Yarnold, P.R. (Ed.). (2000). *Reading and understanding more multivariate statistics*. Washington, DC : American Psychological Association. *([QA278 .R32 2000](#))
- Geer, J.P. van de. (1993). *Multivariate analysis of categorical data*. Newbury Park, CA : Sage. (Available at the UH Downtown: [QA278.G433 1993](#) v. 2)
- Girden, E.R. (1992). *ANOVA: Repeated measures*. Newbury Park, CA: Sage. *([HA29 .G567 1992](#))
- Goodman, L.A., & Magidson, J. (Ed.). (1985). *Analyzing qualitative/categorical data: Log-linear models and latent structure analysis*. Lanham, MD: University Press of America. *([QA278.2.G63 1978B](#))
- Green, P.E. (1978). *Mathematical tools for applied multivariate analysis*. New York: Academic Press. (Available at the UH Downtown: [QA278.G73 1978](#))
- Gupta, A.K. (Ed.). (1987). *Advances in multivariate statistical analysis*. Boston: Kluwer Academic Publishers. *([QA278.A28 1987](#))
- Harris, R.J. (2001). *A primer of multivariate statistics*. Mahwah, N.J.: Lawrence Erlbaum Associates. *([QA278 .H35 2001](#))
- Hagenaars, J.A. (1990). *Categorical longitudinal data: Log-linear panel, trend, and cohort analysis*. Newbury Park: CA: Sage. *([QA278.H33 1990](#))
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- Hand, D.J., & Taylor, C.C. (1987). *Multivariate analysis of variance and repeated measures: A practical approach to behavioral scientists*. London: Chapman and Hall. *([QA278.H345 1987](#))
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Multiple Correlation/Regression

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Foster, D. P., Stine, R.A., & Waterman, R.P. (1998). *Business analysis using regression : A casebook*. New York : Springer. *([HA31.3 .F67 1998](#))

Freund, R.J., & Wilson, W. J. (1998). *Regression analysis : statistical modeling of a response variable*. San Diego : Academic Press. *([QA278.2 .F698 1998](#))

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Factor Analysis

Bartholomew, D.J., & Knott, M. (1999). *Latent variable models and factor analysis*. London: Arnold. *([QA278.6 .B37 1999](#))

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Chicago Press. *([QA276.H38 1967](#))

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Discriminant Function Analysis

Klecka, W.R. (1980). *Discriminant analysis*. Beverly Hills, California: Sage Publications. *([HA31.4 .K56](#))

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Meta-analysis

Bukoski, W. J. (Ed.). (1997). *Meta-analysis of drug abuse prevention programs*. Rockville, MD (5600 Fishers Lane, Rockville 20857) : U.S. Dept. of Health and Human Services, National Institutes of Health, National Institute on Drug Abuse, Division of Epidemiology and Prevention Research : [Supt. of Docs., U.S. G.P.O., distributor]. *(US Document: [HE 20.3965:170](#))

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