UNIVERSITY of **HOUSTON**
GRADUATE COLLEGE of SOCIAL WORK

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

TIME: Monday 9:00 a – 12 noon

FACULTY: Patrick Leung, PhD   **OFFICE HOURS**: M 12-1 p.m.; Tue: 4-5 p.m.
                                                                 Office 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.   Course Objectives
Upon completion of this course, students will be able to demonstrate the following objectives:

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.   Textbooks

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.). (2000). Reading and understanding more multivariate statistics. Washington, D.C.: American Psychological Association. (Chapter 7 only)

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

SPSS, Inc. (2014). SPSS 23.0 for windows brief guide. Chicago, IL: SPSS Inc (or the latest version).

SPSS, Inc. (2014). SPSS for windows graduate pack version, Version 23.0. 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 Psycho¬logical Association (6th ed.). Washington, DC: Author.

Hedderson, 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.

Kinnear, 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. (2013). Using multivariate statistics (6th ed.). Boston, MA: Pearson.

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

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%

Sept 28	Homework Assignment #1 Due	20%
Oct. 19	Homework Assignment #2 Due	20%
Nov. 9	Homework Assignment #3 Due	20%
Nov. 30	Final Exam	30%
	Class Participation	5%
	Class Attendance	5%

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 completed 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 presentations, 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 <u>must</u> set the quote in quotation marks <u>or</u> 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 <u>clearly</u> indicate that this is a direct quotation. Please consult the current APA manual for further information.

Academic dishonesty includes using <u>any</u> 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. It also includes securing another person to complete any required activities, assignments, quizzes, papers, or exams in an online course, or in any on-line environment. If you have any specific questions about plagiarism or academic dishonesty, please raise these questions in class or make an appointment to see the instructor. This statement is consistent with the University Policy on Academic Dishonesty that can be found in your UH Student Handbook.

X. **Course Schedule and Reading Assignments**

TOPICAL OUTLINE AND READING ASSIGNMENTS

Class Session	Lecture Topic and Readings
August 24	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
August 31	Discriminant Function Analysis: An Introduction General Purpose & Description Kinds of Research Questions Limitations Grimm & Yarnold, Ch. 9
September 7	Labor Day (No Class)
September 14	Discriminant Function Analysis: Continued Fundamental Equations Types of Discriminant Function Important Issues Field, pp. 654-664
September 21 to October 5	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 12 to October 26	Logistic Regression General Purpose & Description Kinds of Research Questions Limitations Types of Logistic Regression

Important Issues
Fundamental Equations

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).
Abu-Bader Ch. 5

November 2   Introduction to Structural Equation Modeling

                        Grimm & Yarnold, Ch. 7 (Reading and Understanding More Multivariate Statistics (2000)

November 9 to 23   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

November 30   Final Exam

XI.   Bibliography

Balakrishnan, N. (2012). Methods and applications of statistics in the social and behavioral sciences. Hoboken, N.J: Wiley.

Blalock, H.M., Jr., (1979). 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.

Elliott, A. C., & Woodward, W. A. (2007). Statistical analysis quick reference guidebook: With SPSS examples. Thousand Oaks, Calif: Sage Publications. *(HA29 .E4826 2007)

Foster, J. J., Barkus, E., & Yavorsky, C. (2006). Understanding and using advanced statistics. London: SAGE Publications. *(HA29 .F583 2006)

Frankfort-Nachmias, C. & Leon-Guerrero, A. (2006). Social Statistics for a diverse society (4th ed.). Thousand Oaks: Pine Forge Press

Gaur, A. S., & Gaur, S. S. (2006). Statistical methods for practice and research: A guide to data analysis using SPSS. New Delhi: Response Books. *(HA32 .G38 2006)

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.

Hancock, G. R., & Mueller, R. O. (2010). The reviewer's guide to quantitative methods in the social sciences. New York: Routledge. *(H62 .R466 2010)

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

Huizingh, E. (2007). Applied statistics with SPSS. London: SAGE. *(QA276.4 .H82 2007)

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)

Newman, I. & Newman, C. (2006). Conceptual Statistics for Beginners. Lanham, MD: University Press of America. *(QA276.12.N47 2006)

Newton, R. R., & Rudestam, K. E. (2013). Your statistical consultant: Answers to your data analysis questions. Thousand Oaks: SAGE Publications. *(HA29 .N458 2013)

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

Petscher, Y. M., Schatschneider, C., Compton, D. L., & Petscher, Y. M. (2013). Applied quantitative analysis in education and the social sciences. *(QA278.2 .A67 2013)

Singh, K. (2007). Quantitative social research methods. Los Angeles: Sage Publications. *(H62 .S47757 2007)

Vogt, W. P. (2005). Dictionary of statistics & methodology: A nontechnical guide for the social sciences. Thousand Oaks, Calif: Sage Publications. *(HA17 .V64 2005)

Weinberg, S. L., & Abramowitz, S. K. (2008). Statistics using SPSS: An integrative approach. Cambridge: Cambridge University Press. *(QA276 .W4423 2008)

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

Multivariate Analysis: General

Atkinson, A. C., Riane, M., & Ceriole, A. (2004). Exploring multivariate data with the   forward search. New York: Springer-Verlag . *(QA278.A85 2004) *(QA278.75.A38 2005)

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 (2nd 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)

Cox, T. (2005). An introduction to multivariate data analysis. London: Hodder Arnold. *(QA 278.C698 2005)

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)

Giri, N. C. (1996). Multivariate statistical analysis. New York : M. Dekker. *(QA278 .G557 1996)

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)

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Harris, R.J. (2001). A primer of multivariate statistics. Mahwah, N.J.: Lawrence Erlbaum Associates. *(QA278 .H35 2001)

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Keppel, G., & Zedeck, S. (1989). Data analysis for research designs: Analysis-of-variance and multiple regression/correlation approaches. New York: W.H. Freeman. *(Library of Optometry: HA29 .K435 1989)

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Meyers, L. S., Gamst, G., & Guarino, A. J. (2013). Applied multivariate research: Design and interpretation. Los Angeles: SAGE. *(HA31.3 .M487 2013)

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Nikiforov, A.F., Suslov, S.K., & Uvarov, V.B. (1991). Classical orthogonal polynomials of a discrete variable. Berlin: Springer-Verlag. *(QC20.7.075N5513 1991)

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Read, T.R.C., & Cressie, N.A.C. (1988). Goodness-of-fit statistics for discrete multivariate data. New York: Springer-Verlag.

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Multiple Correlation/Regression

Archdeacon, T. J. (1994). Correlation and regression analysis: a historian's guide. Madison, Wis.: University of Wisconsin Press. (Available in UH Law Library /Stacks: D16.17.A73 1993)

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Draper, N. R., & Smith, H. (1998). Applied regression analysis. New York: Wiley. *(QA278.2 .D7 1998)

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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)

Fox, J., & Fox, J. (2008). Applied regression analysis and generalized linear models. Los Angeles: Sage. *(HA31.3 .F69 2008)

Fox, John (1991). Regression diagnositics. Newbury Park, CA: Sage. *(QA278.2.F63 1991)

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Kleinbaum, D.G. (Ed.). (1998). Applied regression analysis and other multivariable methods. Pacific Grove: Duxbury Press. *(QA278 .A665 1998)

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Loader, C. (1999). Local regression and likelihood. New York: Springer. *(QA276.8 .L6 1999)

Marsden, P.V. (1981). Linear models in social research. Beverly Hills, CA: Sage. *(H61.25.L55)

Menard, S.W. (2002). Applied logistic regression analysis. Thousand Oaks, California: Sage Publications. *(QA278.2 .M46 2002)

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Morrison, D.F. (1983). Applied linear statistical methods. Englewood Cliffs, NJ: Prentice-Hall. *(QA278.M677 1983)

Natraj, A.K. (1993). Achieving successful outcomes in construction projects using regression methods. *(Thesis Collection: Thesis 650 1993.N37)

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

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XII.   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. Instructors may not provide accommodations without supporting documentation from the UH Center for Students with Disabilities.

XIII.   Addenda
To include any additional information the instructor wishes to provide to students, such as guidance regarding course expectations, use of Blackboard, use of electronic devices, classroom behavior, etc.