

**COURSE TITLE/SECTION:** SOCW 8325 (17416) Applied Multivariate Statistics

**TIME:** Tuesday 1:00 p.m. – 4:00 p.m., Room: 221, Social Work Building

**FACULTY:** Patrick Leung, PhD    **OFFICE HOURS:** T 12-1 & 4-5 p.m.

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### I. Course

#### A. Catalog Description

Prerequisite: SOCW 8324 Bio Statistics and doctoral standing in social work. Emphasizes the use of the Statistics Package for Social Sciences (SPSS) in applied social work research.

#### B. Purpose

The purpose of this course is to prepare students to use SPSS to analyze data in a wide variety of applied research settings. This course will focus on advanced statistical procedures in association with procedures in SPSS. Multiple Regression, Analysis of Variance and Analysis of Covariance will be highlighted in the SPSS Program.

### II. Course Objectives

Upon completion of this course, students will be able to:

1. Demonstrate an understanding of the relationship between research design and the use of SPSS in applied social work research;
2. Demonstrate the use of the Statistical Package for Social Sciences to analyze multivariate statistical data in applied social work research;
3. Demonstrate an understanding of the principles of probability theory in basic multivariate statistical analyses including Multiple Regression, Analysis of Variance, Analysis of Covariance in association with the SPSS Program; and
4. Demonstrate an understanding of the programming and commands in the SPSS Program.

### III. Course Content

This course is the second of three 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.

Norusis, M. (1997). SPSS 7.5 guide to data analysis. Upper Saddle River, New Jersey: Prentice Hall, chapters 19-23.

SPSS, Inc. (2015). SPSS for windows graduate pack version, Version 24.0. Chicago, IL: (Author) (or the latest version).

#### **Recommended Texts**

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

Allison, Paul D. (1999). Multiple regression: A primer. Thousand Oaks, CA: Pine Forge Press.

Beck-Lewis, Michael S. (1980). Applied regression: An introduction. Beverly Hills, CA: Sage Publications.

Berry, William D. & Feldman, Stanley (1985). Multiple regression in practice. Beverly Hills, CA: Sage Publications.

Bray, James H. & Maxwell, Scott E. (1985). Multivariate analysis of variance. Beverly Hills, CA: Sage Publications.

Green, S, & Salkind, N. (2011). Using SPSS for Windows and Macintosh: Analyzing and understanding data (6th ed.). Upper Saddle River, NJ: Prentice-Hall, Inc.

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

Iversen, Gudmund R. & Norpoth, Helmut (1976). Analysis of variance. Beverly Hills, CA: Sage Publications.

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

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

Wildt, Albert R. & Ahtola, Olli T. (1978). Analysis of covariance. Beverly Hills, CA: Sage Publications.

## **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. Only hard copies of the assignments will be accepted.

### **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 taken 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 non-excused 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:

Feb. 21	Homework Assignment #1 Due	20%
March 21	Homework Assignment #2 Due	20%
April 11	Homework Assignment #3 Due	20%
April 25	Final Exam	30%
	Class Participation	5%
	Class Attendance	5%

### **Grades:**

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**

Definitions:

"Academic dishonesty" means employing a method or technique or engaging in conduct in an academic endeavor that contravenes the standards of ethical integrity expected at the University of Houston or by a course instructor to fulfill any and all academic requirements. Academic dishonesty includes but is not limited to, the following:

#### *Plagiarism*

a. Representing as one's own work the work of another without acknowledging the source (plagiarism). Plagiarism includes copying verbatim text from the literature, whether printed or electronic, in all assignments including field.

#### *Cheating and Unauthorized Group Work*

b. Openly cheating in an examination, as copying from another's paper; c. Being able to view during an examination, quiz or any in-class assignment an electronic device that allows communication with another person, access to unauthorized material, access to the internet, or the ability to capture an image, unless

- expressly permitted by the instructor;
- d. Using and/or possessing “crib notes,” as unauthorized use of notes or the like to aid in answering questions during an examination;
  - e. Giving or receiving unauthorized aid during an examination, such as trading examinations, whispering answers, and passing notes, and using electronic devices to transmit or receive information;
  - f. Securing another to take a test in the student’s place. Both the student taking the test for another and the student registered in the course are at fault;

*Fabrication, Falsification, and Misrepresentation*

- g. Changing answers or grades on a test that has been returned to a student in an attempt to claim instructor error;
- h. Using another’s laboratory results as one’s own, whether with or without the permission of the owner;
- i. Falsifying results in laboratory experiments;
- j. Misrepresenting academic records or achievements as they pertain to course prerequisites or corequisites for the purpose of enrolling or remaining in a course for which one is not eligible;
- k. Representing oneself as a person who has earned a degree without having earned that particular degree

*Stealing and Abuse of Academic Materials*

- l. Stealing, as theft of tests or grade books, from faculty offices or elsewhere, or knowingly using stolen tests or materials in satisfaction of exams, papers, or other assignments; this includes the removal of items posted for use by the students;
- m. Mutilating or stealing library materimaterials; misshelving materials with the intent to reduce accessibility to other students;

*Complicity in Academic Dishonesty*

- n. Failing to report to the instructor or departmental hearing officer an incident which the student believes to be a violation of the academic honesty policy;

*Academic Misconduct*

- o. Any other conduct which a reasonable person in the same or similar circumstances would recognize as dishonest or improper in an academic setting.

**Process:**

Students shall have the responsibility of reporting incidents of alleged academic dishonesty to the instructor of record involved or to the appropriate authority if the alleged act is not associated with a specific class within 5 class days of the incident.

Faculty or instructor of record shall have the responsibility of reporting incidents of alleged academic dishonesty through their college hearing officer within 5 class days of the incident. The faculty should include the recommended sanction in the report.

The college hearing officer will notify the student of the report and recommended sanction. The student can accept the sanction and waive a hearing or request a college hearing. A hearing shall be set within 10 days and would be consist of two faculty and three students chosen by the hearing officer.

## X. Course Schedule and Reading Assignments

### TOPICAL OUTLINE AND READING ASSIGNMENTS

<u>Class Session</u>	<u>Lecture Topic and Readings</u>
January 17	Introduction Review of Course Syllabus A Framework for Statistical Analysis Review of Univariate and Bivariate Statistics  Abu-Bader Ch. 1 & 2 Field Ch. 1, 2, 3, 4, 6, 7 and 9
January 24	Review of Simple Linear Regression  Abu-Bader Ch. 3
January 31	Issues in Statistical Assumptions  Field Ch. 5
February 7 to February 14	Multiple Regression Analysis I The Regression Assumptions Confidence Intervals and significance test The Prediction Error for Y Analysis of Residuals  Abu-Bader Ch. 4 Field, Ch. 8
<b><u>February 21</u></b>	<b><u>Homework Assignment #1 Due</u></b>
February 21	Multiple Regression Analysis II The General Equation Interpreting the Parameter Estimates The Multiple R-square Predicting Y The Possibility of Interaction Effects Dummy Variables  Norusis, Ch. 19-23 (to be placed outside my office door)
February 28	Multiple Regression Analysis III Specification Error Measurement Error Multicollinearity & Nonlinearity

	Moderation & Mediation
	Field, Ch. 10
March 7	One-Way ANOVA Two-Way ANOVA
	Abu-Bader Ch. 1 and 6 Field, Ch. 11 (ANOVA) & 13 (Factorial ANOVA)
March 14	Spring Break (No Class)
<b><u>March 21</u></b>	<b><u>Homework Assignment #2 Due</u></b>
March 21 to March 28	Two-Way ANOVA Two-way Analysis of Covariance
	Abu-Bader Ch. 7 Field, Ch.14 (ANCOVA)
April 4 to to April 18	MANOVA & MANCOVA
	Abu-Bader Ch. 9 Field, Ch.16
<b><u>April 11</u></b>	<b><u>Homework Assignment #3 Due</u></b>
<b><u>April 25</u></b>	<b><u>Final Exam</u></b>

## **XI. Bibliography**

### **Statistical Methods: Basic**

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- Blalock, H.M., Jr., (1979). *Social statistics* (2nd ed.). New York: McGraw-Hill.  
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- Bohrstedt, G.W.B., & Knoke, D. (1982). *Statistics for social data analysis*. Itasca, IL: Peacock.
- 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)
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- 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. (2011). *An introduction to mathematical statistics and its applications* (5th ed.). 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)
- 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., & Creole, 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.
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- 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)
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- Grimm, L.G., & Yarnold, P.R. (Ed.). (2000). Reading and understanding more multivariate statistics. Washington, DC: American Psychological Association.  
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- Geer, J.P. van de. (1993). Multivariate analysis of categorical data. Newbury Park, CA:

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- Hand, D.J., Taylor, C.C., & Hand. H. J. (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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## **XII. Americans with Disabilities Statement**

The University of Houston System complies with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990, pertaining to the provision of reasonable academic adjustments/auxiliary aids for students with a disability. In accordance with Section 504 and ADA guidelines, each University within the System strives to provide reasonable academic adjustments/auxiliary aids to students who request and require them. If you believe that you have a disability requiring an academic adjustments/auxiliary aid, please contact the UH Center for Disabilities at 713-743-5400.

## **XIII. 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 (Social Work Building Room 444), or by e-mail at [pleung@uh.edu](mailto:pleung@uh.edu) or by fax at (713) 743-8149