**Advanced Social Statistics**

**Sociology 6290**

**Winter 2020**

**Course Time: Wednesday 5:00-7:30**

**Course Location: Social Science Data Lab**

Instructor: David M. Merolla, Ph.D

Office: 2253 FAB

Telephone 313-577-2930 (Main sociology number)

email: [dmerolla@wayne.edu](mailto:dmerolla@wayne.edu)

Office Hours: Thursday 1-3pm, or by appointment

Recommended Textbook: Tabachnikck, Barbara, and Lind Fidell. 2007. *Using Multivariate Statistics*

*5th Ed.* New York: Pearson Publishing. ISBN:0-205-45938-2

Other Requirements: Required course readings posted on Canvas

Students must have access to SPSS to complete homework assignments and projects

Students must have a calculator capable of calculating square roots

**Course Description:**

This course is an advanced course on statistical methods used in sociology and other social sciences. The course is designed to provide students the necessary skills to both understand and conduct quantitative research. As such, the course will cover the mathematical/ technical aspects of advanced statistical procedures as well as the conceptual and substantive bases for these techniques. Additionally, the hands on nature of the course will allow students to increase their skills using SPSS for statistical analysis and data management. The course will review and extend previous knowledge of data screening, bivariate statistical techniques and multiple regression. The course will then move to topics such as generalized linear modeling, exploratory factor analysis, missing data methods and multi-level modeling.

**Student Learning Objectives**

1. Students will be able to use SPSS to screen data and conduct bivariate statistical techniques.
2. Students will be able to use SPSS to conduct multiple regression including regression diagnostics, using dummy variables, using interaction terms and using polynomials.
3. Students will be able to interpret the results of a regression analysis in relation to a research question.
4. Students will be able to explain the difference between mediation and moderation models.
5. Students will understand the basics of generalized linear modeling, factor analysis, panel models and missing data techniques. Students will understand the situations when such methods are used and how to interpret output from these models.
6. Students will be able to determine the benefits and drawbacks of using particular statistical techniques to answer specific research questions, and the bases of such choices.
7. Students will be able to articulate the relationship between statistical modelling techniques and conceptual research problems.
8. Students will be able to present the results of statistical analysis in a form consistent with current standards in academic journals and professional meetings.

**General Course Policies**

**Attendance.** Attendance in class is mandatory and essential. Students who miss more than two class meetings will not be eligible for a grade of A. Repeated absences may result in being asked to drop or withdraw from the course with a failing grade. Students arriving more than 15 minutes late will be considered absent. Please contact me immediately if you cannot consistently be in class and ready to begin at 5:00pm.

**Assignments.** Students are required to complete all assignments by the due date; students who have difficulty with a particular assignment on time are expected to contact the instructor to discuss these problems prior to the assignment due date. Assignments not completed by the due date will be evaluated at the instructor’s discretion.

**Reading.** Students are required to read all course materials by the time class begins and notify the instructor if they have difficulty completing required reading. If you did not understand a particular reading or concept please come to class with questions regarding that reading. I believe that you should have free access to all of assigned readings free of charge through the WSU libraries, if you have any difficulties accessing a specific paper, please contact me as soon as possible, it is possible that the citation in the syllabus is erroneous. Please do not pay to access a course reading.

**Office Hours.** Office hours are designed for me to answer specific questions or assist with specific aspects of an assignment. Please come to office hours with questions ready and attempt to complete assignments independently prior to coming to office hours. If you think you will need more that 20 minutes of time, please schedule an appointment.

**Focus.** Students are expected to be focused on class presentations during class time. Lab computers should be used for coursework only. Cell phone use in class is strictly prohibited.

**Final Grades.** Final grades submitted by the instructor are final. If you believe that there has been a clerical error or other mistake you may inquire for an accounting of your grade. However, grades will be based solely on your scores on course assignments and will not be arbitrarily adjusted at the end of the term. Students who ‘need’ a particular grade should ask me early in the semester about whether they are on track.

**Academic Honesty.** Students are expected to display academic integrity in all of their work for this course. Academic dishonesty includes cheating, fabrication, and plagiarism. Any student suspected of dishonesty in their work will receive a zero for the assignment in question and referred to the department chair for further disciplinary action. If you have any questions about academic honesty or plagiarism, please contact me.

**Honor Code.** Students are bound by the Wayne State University honor code which states: “Wayne State University holds its students to the highest academic standards. Pride in the University and in oneself requires students to maintain an environment free from any breach of academic honesty. As lifelong representatives of Wayne State, we seek to cultivate honor, integrity, and civility in order to ensure that we earn our degree honestly and that we provide an ethical platform for our continued success”

**Registration.** Students may drop this class through January 17th.  Classes that are dropped do not appear on the transcript. After January 18 students are no longer allowed to drop but must withdraw from classes. It is the student’s responsibility to request the withdrawal through the registrar’s office. Failure to do so will result in a grade of F. Students must be passing at the time of the request to receive a grade of ‘WP.’ After March 22, you cannot withdrawal from the course and you will receive a letter grade. Incomplete ‘I’ grades are given in very limited circumstances to students who are passing the course and cannot complete final assignments due to extraordinary circumstances. Students that get a grade of incomplete must complete all assignments by May 30,2020.

**Disability.** If you have a documented disability that requires accommodations, you need to register with Student Disability Services (SDS) for coordination of your academic accommodations. The Student Disability Services (SDS) office is located at 1600 David Adamany Undergraduate Library in the Student Academic Success Services department. SDS telephone number is 313-577-1851 or 313-577-3365 (TDD only). Once you have your accommodations in place, I will be glad to meet with you privately during my office hours to discuss your special needs. Student Disability Services’ mission is to assist the university in creating an accessible community where students with disabilities have an equal opportunity to fully participate in their educational experience at Wayne State University.

**Assignments and Grading**

1. Participation (20%):

As well as coming to class on time, students are expected to actively participate in class. Just coming to class will not gain full participation points. Students are expected to come to class prepared and to stay focused on the course. You will be asked questions about course content during each course meeting.

2. Homework (40%):

There will be five homework assignments for this course. The homework assignments will require the use of SPSS and will be presented like the methods and or results section in an academic journal article. All homework assignments must be completed in a professional manner (e.g., typed, proofread, complete sentences, **no SPSS tables,** etc...). All homework assignments will be explained in detail in class and will be due on a Sunday.

3. Midterm Exam (15%):

There will be a midterm exam on February 12th. This exam will cover topics from the first several weeks of class.

4. Final Paper (25% points):

Each student must complete a quantitative research paper using a multivariate statistical technique. The research paper should be on a topic of interest to you. Students are encouraged to talk with their faculty advisors or other mentors for advice on appropriate research questions and datasets. Additionally, the nature of the research paper may be altered given students status and needs (e.g., you are working on a dissertation, you have a paper in progress, etc…), so please contact me if you have any specific questions regarding your paper.

The final paper should be in the style of a submission to a contemporary academic journal, with a focus on the methods and results portion of the paper. The final paper will be graded based on 1) completion of each task on time (see below), 2) a well- articulated research question, 3) the appropriateness of the methodology chosen, 4) the execution of the quantitative analyses, 5) the written presentation of the quantitative analyses including tables, and 6) the overall clarity and professionalism of the writing.

**Timeline for Final Research Paper:**

February 7th: Turn in research question/topic, annotated bibliography with at least 10 citations and possible datasets to be used

March 13th: Students turn in description of dataset, hypotheses and descriptive statistics for their final paper

April 10th: Rough Drafts of papers can be submitted for review (optional)

April 24th: Final Papers Due

**All work, including participation, will be graded on the following 6 point scale:**

**“A” level work** consists of cogent, well-articulated, and well-developed written presentation, demonstrating exceptional understanding, preparation, insight, originality, logical argumentation, and factual accuracy. “A” level work is completed on time and according to the guidelines. “A” level work is considered excellent. (6/6)

**“A-“ level work** consists of cogent, well-articulated, and well-developed written presentation, demonstrating very good understanding, preparation, insight, originality, logical argumentation, and factual accuracy. “A-“ level work is completed on time and according to the guidelines. “A-” level work is considered very good. (5/6)

**“B+” level work** consists of well-written work that demonstrates an acceptable understanding, preparation, insight, originality, logical argumentation, and factual accuracy. “B+” work is acceptable graduate level work, but only shows a basic grasp of concepts and ideas and with only satisfactory levels of communication. (4/6)

**“B” level work** consists of work that reflects a minimally adequate understanding, preparation, insight, originality, logical argumentation, and factual accuracy. “B” level work is considered mediocre and is the lowest passing grade in the course. (3/6)

**“B-” level work** is not adequate in either form or content, thereby not fully meeting the minimum requirements. “B-” level work is not passing at the graduate level. A final grade of “B-”will require you to retake this course. (2/6)

**“C” level work** shows the barest understanding of the subject or task assigned, is poorly written, and fails to make a coherent argument. A final grade of “C” may lead you to be removed from the graduate program. (1/6)

**Other Suggested Resources/ Further Reading:**

The course textbook is a survey book, which covers most topics briefly. If you need or want additional resources for topics/techniques covered in this course I recommend the following titles (those marked with asterisk are owned by the WSU Library):

**Regression**

McClendon, McKee. 1994. *Multiple Regression and Causal Analysis.* Itasca, IL: Peacock Publishers.

\*Aiken, Leona, Stephen West and Raymond Reno. 1991. *Multiple Regression: Testing and Interpreting Interactions. Thousand Oaks, CA: Sage Publications.*

**Generalized Linear Models**

Long, J. Scott. 1997. *Regression Models for Categorical and Limited Dependent Variables.* Thousand Oaks, CA: Sage Publications

\*Liao, Tim Futing. 1994. *Interpreting Probability Models: Logit, Probit and Other Generalized Linear Models.* Thousand Oaks, CA: Sage Publications. (Quantitative Applications in the Social Sciences # 101).

**Mediation/ Process Approach**

Hayes, Andrew. 2017. Introduction to Mediation, Moderation, and Conditional Process Analysis A Regression Based Approach. New York: Guilford Press.

**Exploratory Factor Analysis**

Pett, Majorie A, Nancy R. Lackey, and John J. Sullivan. 2003. *Making Sense of Factor Analysis: The Use of Factor Analysis for Instrument Development in Heath Care Research*. Thousand Oaks, CA: Sage Publications.

**Confirmatory Factor Analysis/ Structural Equation Modeling**

\*Raykov, Tenko, and George A. Marcoulides. 2006. *A First Course in Structural Equation Modeling*.

London, England: Psychology Press

**Multi-Level Models**

\*Raudenbush, Stephen W., and Anthony Bryk. 2002. *Hierarchical Linear Models: Applications and Data Analysis Methods 2nd Ed*. Thousand Oaks CA: Sage Publications.

# \*Bickel, Robert. 2007. *Multilevel Analysis for Applied Research: It's Just Regression!.* New York:The Guilford Press

**Longitudinal Models/Panel Data**

Singer, Judith D., and John B. Willett. 2003. *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. Oxford, England: Oxford University Press.

**Course Schedule (subject to change)**

**Week 1 (January 8):** Introduction to the Course and Course Requirements; Assessment & Review

**Week 2 (January 15):** Basic Stats Review; Data Screening and Bivariate Association/ Introduction to SPSS Command Syntax/ Making Tables

*Read:* Tabachnick and Fidell: Chapters 1-4

Cohen, Jacob. 1994. “The Earth is Round (p<.05).” *The American Psychologist* 49(12): 997-1003.

Greenland, Sander, Stephen Senn, Kenneth Rothman, John Carlin, Charles Poole, Steven Goodman, and Douglas Altman. 2016. “Statistical Tests, P-Values, Confidence Intervals, and Power: A Guide to Misinterpretations.” *European Journal of Epidemiology* 31:337-350.

**Week 3 (January 22):** Multiple Regression Review and Regression Diagnostics

*Read:* Tabachnick and Fidell: Chapter 5

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**Week 4 (January 29):** Non-Linear Effects in Multiple Regression

*Read:* Tabachnick and Fidell: Chapter 5

**Week 5 (February 5):**  Logistic Regression & Generalized Linear Models

*Read:* Tabachnick and Fidell: Chapter 10

Nagasawa Richard and Zhenchao Qian, and Paul Wong. 2001. “Theory of Segmented Assimilation and the Adoption of Marijuana Use and Delinquent Behaviors among Asian Pacific Youth.” *The Sociological Quarterly* 42(3): 351-72.

**Week 6 (February 12):** Exam 1

**Week 7 (February 19):** Multi-Level Modeling

*Read:* Tabachnick and Fidell: Chapter 15

Huffman, Matt L. and Philip N. Cohen. 2004. “Racial Wage Inequality: Job Segregation and Devaluation across U.S. Labor Markets.” *American Journal of Sociology* 109(4) 902-36.

**Week 8 (February 26):** Exploratory Factor Analysis

*Read:* Tabachnick and Fidell Chapter 13

Henry, Patrick J., and David O. Sears. 2002. "The Symbolic Racism 2000 Scale." *Political Psychology* 23(2): 253-83.

**Week 9 (March 4):** Approaches to Dealing with Missing Data

*Read:*

Schafer, Joseph L. and John W. Graham. 2002. Missing Data: Our View of the State of the Art. *Psychological Methods* 7(2): 147-177.

White, Ian, Patrick Royston and Angela Wood. 2010. “Multiple Imputation using Chained Equations: Issues and Guidance for Practice.” *Statistics in Medicine* 30: 377-399.

**Week 10: (March 11):**  No Class- Spring Break

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**Week 11: (March 18):** Panel /Growth Models

*Read:* Tabachnick and Fidell Chapter 11 and 18

Cheadle, Jacob 2008 “[Educational investment, family context, and children's math and reading growth from kindergarten through the third grade](http://journals.sagepub.com/doi/abs/10.1177/003804070808100101).” *Sociology of Education*  81(1):1-31.

**Week 12 (March 25):** Event History Analysis

Singer, Judith and John B. Willet. 1993. “It’s About Time: Using Discrete-Time Survival Analysis to Study Duration and Timing of Events.” *Journal of Educational Statistics* 18(2): 155-195.

**Week 13 (April 1):** Causal Effects Modelling

Kim, Hyun Sik. 2011. Consequences of Parental Divorce for Child Development. *American Sociological Review* 76(3):487-511.

Gangl, Markus. 2010. “Causal Inference in Sociological Research.” *Annual Review of Sociology* 36:21-47.

**Week 14 (April 8): TBA**

**Week 15 (April 15):** Catch Up and Review Day

**Week 16 (April 22):** Final Papers Due