

Sociology 521: Regression Models
Spring 2017 (3 credits), T, Th: 1:25-2:40 PM, CUE 407

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Office Hours: **Tues, 10:30-noon**

Course web page: learn.wsu.edu

Details in syllabus are subject to change. I will make multiple announcements in class about any changes.

Introduction

Sociology 521: Regression Models will introduce you to regression analysis as it is used in sociology and other social science disciplines. Regression analysis is a powerful statistical tool used to examine the relationship between a dependent variable and two or more independent variables. The primary substantive topics in this class will relate to a thorough examination of the ordinary least squares regression model, including coverage of standard regression assumptions. As time permits, we will explore more advanced extensions of the basic model. In order to succeed in this class, you should already be quite familiar with basic concepts covered in an introductory statistics course, such as descriptive measures for continuous distributions (e.g., mean, standard deviation) and association (e.g., correlation) and hypothesis testing.

Course topics will focus on real-world applications of regression techniques to archival data. In some cases it will be necessary to consider the statistical theory underlying a technique in order to receive full credit, although a complete understanding of theory will not be necessary to pass the class. In this class, you will learn how to specify and estimate regression models, how to interpret results from regression models, and how to present results from regression models in publication-quality tables.

Computer Use

As part of this applied focus, you must have some familiarity with at least one statistical software package. I will use Stata in examples because many sociologists use this software and computers in the network lab in Wilson-Short Hall (room 231) have the program installed. Stata is a comprehensive statistical software package that you can use to analyze data and help solve problems. You are free to use whatever software program you are comfortable with, but you will need to use some computer software. As we manipulate and analyze data, you must use a variety of data management and analysis techniques, many of which are implemented in a variety of statistical analysis programs. Additionally, you should have a basic understanding of introductory computer data management techniques.

Required Textbook

Chatterjee, Samprit and Ali S. Hadi. 2012. Regression Analysis by Example, 5th Edition
Hoboken, NJ: John Wiley & Sons.

In addition to the required text, assignments and exams might require you to use articles published in sociology journals.

Grading

Your final grade will be based on three exams and a final exam. All four tests will be scaled to 100%. During the semester, the exam format will be a mixture of take-home and in-class exams. Take-home exams will require you to use statistical software to complete. Questions on the exams may cover any of the class material up to that date, although most of the material on an exam will come from sections covered in the weeks prior to the exam. I will provide more information about an exam in class as the exam date draws near. The final exam is due by Sunday, April 30 at 5:00 PM. Details will be provided in class.

Much of the exam material will be based on exercises and problems from the textbook. I will assign problem sets for each chapter as we progress. I encourage you to work together on the textbook problems. However, you should understand how to complete the problems on your own. We will dedicate significant class time to discussing questions about the assigned textbook problems.

Test dates and grading percentage breakdown

February 9 (in-class), Exam 1:	25%
March 23 (take-home), Exam 2:	25%
April 20 (to be determined), Exam 3:	25%
Final Exam, due by 5:00 PM April 30 (take home):	25%

This course will follow a standard grading scheme, although I reserve the right to alter the grade letter cut-offs in your favor at the end of the semester.

A:	94-100%	C+:	77-79%	F:	59% and below
A-:	90-93%	C:	70-76%		
B+:	87-89%	D+:	67-69%		
B:	80-86%	D:	60-66%		

Schedule

The Schedule section presents the general order for topics covered in this class, although we may deviate from the schedule as needed. The list of topics provides only a general overview of topics, to give you an idea of what we will cover. The list is not exhaustive and we will likely skip some topics and cover additional topics, especially related to data management.

1. Introduction to Regression Models

What is regression analysis? Computer software, Data collection and data management, Example applications of regression analysis; Steps in regression analysis

2. Simple Linear Regression

Covariance, Correlation, Simple (Bivariate) regression model, parameter estimation formulas, hypothesis tests, confidence intervals, predictions, model fit, no-intercept model, regression and t-test of means

3. Multiple Linear Regression

Parameter estimation, Interpretation of coefficients, Centering and scaling variables, Properties of OLS estimators, model fit, hypothesis tests / inference, Predictions, Quadratic Model (see section in Ch. 13, p. 364) Matrix Notation (appendix)

4. Regression Diagnostics

Standard Assumptions, Residuals, Graphical diagnostic methods, Checking linearity and normality, Influence and outliers, Measures of influence, Variable selection (model specification)

5. Qualitative (Categorical) Independent Variables

Indicator/Dummy Variables, Interactions, Systems of Regression Equations (comparing groups), Seasonality, Stability of regression parameters over time

6. Transformation of Variables

Linearity, Stabilizing variance, Detection of heteroscedastic errors, Logarithmic and power transformations

7. Weighted Least Squares

Heteroscedastic models

8. Correlated Errors Problem

Autocorrelation, Durbin-Watson Statistic, Seasonality

9. Analysis of Collinear Data

Multicollinearity: effects, detection, and treatment

10. Working with Collinear Data

Principal Components, Principal Components regression, Ridge regression

11. Variable Selection Procedures

Model building, consequences of variable deletion, criteria for evaluating equations

12. Logistic Regression (if time allows)

Logit model, Diagnostics, Fit, Multinomial logit model

13. Further topics (if time allows)

Generalized Linear Model, Poisson Regression, Robust Regression

Attendance: I will not take formal attendance in this class. I will not provide any lecture materials outside of class for any reason. If you miss class, you will need to get the notes from another student.

Academic Integrity: There is no excuse for using another student's work or ideas and turning them in as your own. Students who plagiarize or who otherwise cheat on any assignment will receive a failing grade for the course. If you are a graduate student in the Department of Sociology, the consequences for plagiarizing or cheating will be even more severe, in some cases moving well beyond institutional sanctions as your professional reputation will be damaged severely. It is the responsibility of any student who does not understand what plagiarism is to consult the instructor.

Recording prohibited: You may not record lectures or course material with any visual or auditory device (see disability statement below for exceptions). I will post chapter outlines for the textbook on the course web site prior to each exam.

Access Center: Reasonable accommodations are available for students with a documented disability. If you have a disability and need accommodations to fully participate in this class, please either visit or call the Access Center (Washington Building 217; 509-335-3417) to schedule an appointment with an Access Advisor. All accommodations MUST be approved through the Access Center.

Safety information: Washington State University is committed to enhancing the safety of the students, faculty, staff, and visitors. It is highly recommended that you review the Campus Safety Plan (<http://safetyplan.wsu.edu/>) and visit the Office of Emergency Management web site (<http://oem.wsu.edu/>) for a comprehensive listing of university policies, procedures, statistics, and information related to campus safety, emergency management, and the health and welfare of the campus community.