

Statistics for Sociological Research

SOC 30903, Spring 2017

TR 12:30 p.m. – 1:45 p.m.

331 DeBartolo Hall

Instructor: Marshall A. Taylor, M.A.

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Description

We frequently encounter statements or claims based on statistics, such as: “Women earn less than men,” “The American population is becoming more racially and ethnically diverse,” or “Married people are healthier than unmarried people.” On what information are these statements based? What kinds of evidence support or refute such claims? How can we assess their accuracy? This course will show students how to answer these sorts of questions by interpreting and critically evaluating statistics commonly used in the analysis of social science data. Hands-on data analysis and interpretation are an important part of the course.

Objectives

You should finish the course with the ability to interpret, question, and discuss statistics accurately and with an understanding of which type of statistic is appropriate for different kinds of data and research questions. You should also finish the course with basic programming and data analysis skills in the Stata statistical computing environment.

Required Materials

- Healey, Joseph F. 2015. *The Essentials of Statistics: A Tool for Social Research*. 4th ed. Belmont, CA: Wadsworth. (Note: The new 4th edition is very expensive. I will teach with this version, but it is quite all right if you want to purchase/rent the 3rd edition. If you go with the earlier edition, however, it will be up to you to get the appropriate lesson and homework page numbers from one of your classmates using the 4th edition.)

- A calculator. (You don't need an expensive one, but you will not be allowed to use your phone or laptop as a calculator during exams.)
- Graph paper.

Attendance and Participation

Learning statistics, like any math subject, is a cumulative process and requires consistent practice. As such, it is important that you attend every class and participate in class discussions. I will not take attendance in this class, but an unexcused absence will not be justification for missing any pop-quizzes or tests, or for missing homework assignment deadlines. I also reserve the right to consider persistent absences, late arrivals, and poor class participation in making final grade determinations.

Course Requirements

There will be four components to your final grade for the course: homework assignments, three exams, three Stata projects, and pop-quizzes. Each of these components is explained below.

Homework (20% total): There will be 9 homework assignments throughout the course of the semester, each of them due by the start of class on the specified date. I encourage you to work in groups on these assignments, though this is not required. That being said, everything you write should be in your own words and all math should reflect your own work. Any and all copied homework will receive a zero—no exceptions—and will be subject to any repercussions for academic dishonesty as stated in the Undergraduate Academic Code of Honor. If you work in groups, I expect you to make a note at the top of your homework indicating with whom you worked and on which problems. Each homework assignment will be graded on a 0-4 scale, with a 4 given to an assignment completed with full understanding of the material, a 3 for an assignment completed with adequate understanding of the material, a 2 for an assignment completed but with poor understanding of the material, a 1 for an assignment completed with an unacceptable understanding of the material, and a 0 for an assignment that is incomplete/copied/not submitted. The final grade will be computed using the average from your homework assignments.

Exams (45% total): There will be three exams in this course. The first exam will be on February 14th and will address all material covered through February 9th. The second exam will be on March 21st and address all material covered from February 21st through March 9th. The third exam will be during the university-scheduled final exam date and time and will be cumulative. You are allowed to bring a “cheat sheet” to the exams on one piece of 8.5” by 11” paper, front and back. The first two exams will be worth 12.5% of your final grade; the final will be worth 20% of your final grade.

Stata Projects (30% total): There will be three projects throughout the semester that require you to run your own data analyses in the Stata statistical computing environment. These projects must be completed individually and will be subject to the same repercussions for academic dishonesty mentioned in the Homeworks section above. These projects will not be super intensive, but they will require work above and beyond what I would expect from a homework assignment. All datasets for the projects will be made available to you through the “Project Materials” folder in Sakai. Each project will be worth 10% of your final grade.

Pop-Quizzes (5% total): I will give ten pop-quizzes throughout the semester that will test your knowledge on the previous class lecture. These quizzes will be graded using the system outlined in the Homeworks section above. The final grade will be computed using the average from your pop-quizzes.

Grading

Every grade given in this course will be on a 0-4 scale. Your final grade will then be converted into a letter grade between A and F using the following table:

Grade	A	A-	B+	B	B-	C+	C	C-	D	F
Range	4.0 - 3.815	3.814 - 3.5	3.49 - 3.165	3.164 - 2.815	2.814 - 2.5	2.49 - 2.165	2.164 - 1.815	1.814 - 1.5	1.49 - 0.75	0.74 - 0.00

This system makes it easy to calculate your grade as you progress through the course. For example, let’s say a student is trying to figure out how well they need to do on the final exam to get an A-. They have an average homework grade of 3.5, an average pop-quiz grade of 3.5, a 3.8 on the first exam, a 3.25 on the second exam, and a 2.9, 3.5, and 4.0 on the Stata projects. Now they can just plug in the numbers with the appropriate grading weights:

$$.2(\text{Avg. Homework}) + .05(\text{Avg. Quiz}) + .125(\text{Exam 1}) + .125(\text{Exam 2}) + .2(\text{Exam 3}) + .1(\text{Project 1}) + .1(\text{Project 2}) + .1(\text{Project 3}) = \text{Final Points}$$

$$.2(3.5) + .05(3.5) + .125(3.8) + .125(3.25) + .2(\text{Exam 3}) + .1(2.9) + .1(3.5) + .1(4.0) = 3.5$$

$$.2(\text{Exam 3}) = .70375$$

$$\text{Exam 3} = 3.52$$

As such, this student would need at least a 3.52 on the final exam to get a final grade of 3.5, which would translate into an A-.

Honor Code

You are expected to abide by the University of Notre Dame Undergraduate Code of Honor at all times. Failures to do so will be addressed according to official university policy. Familiarize yourself with the honor code at honorcode.nd.edu.

Accommodations

If you require classroom accommodations, please meet with me as soon as possible so that we may communicate with the appropriate offices to ensure that your needs are met. If you think you may need accommodations, you can contact the Sara Bea Disability Services office and set up a confidential consultation either in person or by phone (at 574-631-7157). More information can be found at the office website: sarabeadisabilityservices.nd.edu.

Schedule

Unit One: Samples, Populations, and Descriptive Statistics

Week One: Introduction, Samples, and Levels of Measurement

- January 17th
 - **Class:** Syllabus and introduction
 - **Read:** No readings
- January 19th
 - **Class:** Samples, populations, and levels of measurement
 - **Read:** Healey, Prologue and Chapter 1

Week Two: Descriptive Statistics

- **January 24th**
 - **Class:** Measures of central tendency
 - **Read:** Healey, Chapter 2 and Chapter 3
- **January 26th**
 - **Class:** Measures of dispersion
 - **Read:** Healey, Chapter 4

Week Three: From Description to Inference

- **January 31st**
 - **Class:** Descriptive statistics in Stata
 - **Read:** Stata Handout #1 (Sakai)
- **February 2nd**
 - **Class:** The normal curve, its properties, and probability estimation
 - **Read:** Healey, Chapter 5
 - **Due:** Homework #1

Unit Two: Inferential Statistics

Week Four: The Normal Curve and Sampling Distributions

- **February 7th**
 - **Class:** Central Limit Theorem, pt. 1
 - **Read:** Healey, review Chapter 5 and read Chapter 6
 - **Read:** Wheelan, “The Central Limit Theorem: The LeBron James of Statistics” (Sakai)
- **February 9th**
 - **Class:** Central Limit Theorem, pt. 2
 - **Read:** Wheelan, “The Central Limit Theorem: The LeBron James of Statistics” (Sakai)
 - **Watch:** CreatureCast video, “As ‘Normal’ as Rabbits’ Weights and Dragons’ Wings” (*New York Times*, September 23, 2013) (Sakai)
 - **Due:** Homework #2
 - **Due:** Stata project #1 (through Sakai by midnight)

Week Five: Hypothesis Testing I

- **February 14th**

- **Class:** Exam #1 (bring cheat sheet and calculator)
- **February 16th**
 - **Class:** One-sample hypothesis tests
 - **Read:** Healey, Chapter 7

Week Six: Hypothesis Testing II

- **February 21st**
 - **Class:** Two-sample hypothesis tests, pt. 1
 - **Read:** Healey, Chapter 8
- **February 23rd**
 - **Class:** Two-sample hypothesis tests, pt. 2
 - **Read:** Healey, Chapter 9

Week Seven: Hypothesis Testing III

- **February 28th**
 - **Class:** Hypothesis testing with means from more than two samples
 - **Read:** Healey, Chapter 9
 - **Due:** Homework #3
- **March 2nd**
 - **Class:** Hypothesis testing between nominal and ordinal variables
 - **Read:** Healey, Chapter 10

Unit Three: Measuring Association

Week Eight: Association between Nominal and Ordinal Variables

- **March 7th**
 - **Class:** Hypothesis testing in Stata
 - **Read:** Stata handout #2 (Sakai)
- **March 9th**
 - **Class:** Measures of association between nominal and ordinal variables, pt. 1
 - **Read:** Healey, Chapter 11, pp. 291 – 327
 - **Due:** Homework #4

Week Nine: Spring Break, No Class

Week Ten: Association between Interval-Ratio Variables

- **March 21st**
 - **Class:** Measures of association between nominal and ordinal variables, pt. 2
 - **Read:** Healey, Chapter 11, pp. 291 – 327
- **March 23rd**
 - **Class:** Measures of association between interval-ratio variables
 - **Read:** Healey, Chapter 12, pp. 341 – 350
 - **Due:** Homework #5

Unit Four: Regression and Analysis with Multiple Variables

Week Eleven: Bivariate (“Simple”) Regression

- **March 28th**
 - **Class:** Exam #2 (bring cheat sheet and calculator)
- **March 30th**
 - **Class:** Correlation and the bivariate regression equation, pt. 1
 - **Read:** Healey, Chapter 12, pp. 329 – 340 and pp. 351 – 362

Week Twelve: More on Bivariate Regression

- **April 4th**
 - **No class; test make-up**
- **April 6th**
 - **Class:** Bivariate regression, pt. 2
 - **Read:** Healey, Chapter 12, pp. 329 – 340 and pp. 351 – 362
 - **Due:** Homework #6

Week Thirteen: Multiple Regression and Regression in Stata

- **April 11th**
 - **Class:** Multiple Regression
 - **Read:** Healey, Chapter 13
 - **Due:** Stata project #2
- **April 13th**
 - **Class:** Bivariate and multiple regression in Stata
 - **Read:** Stata handout #3 (Sakai)
 - **Due:** Homework #7

Week Fourteen: Regression Assumptions

- **April 18th**
 - **Class:** The Gauss-Markov assumptions, pt. 1
 - **Read:** Wooldridge, pp. 73 – 77, pp. 81 – 83, and pp. 105 – 108 (Sakai)
- **April 20th**
 - **Class:** The Gauss-Markov assumptions, pt. 2
 - **Read:** Wooldridge, pp. 73 – 77, pp. 81 – 83, and pp. 105 – 108 (Sakai)
 - **Due:** Homework #8

Week Fifteen: Introduction to Logistic Regression

- **April 25th**
 - **Class:** Logistic regression, pt. 1
 - **Read:** TBA
- **April 27th**
 - **Class:** Logistic regression, pt. 2
 - **Read:** TBA
 - **Due:** Homework #9

Week Sixteen: Wrap-Up

- **May 2nd**
 - **Class:** Review session for final exam

Stata project #3 due by Thursday, May 11th, at midnight

Final Exam: Thursday, May 11th
10:30 a.m. – 12:30 p.m.
331 DeBartolo Hall