PSCI 7085: Introduction to Political Science Data Analysis

Sarah Hunter

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Course Description

From the CU Boulder Course Catalogue: "Provides intensive experience with quantitative techniques commonly employed in political science research, covering basic inferential and descriptive statistics through multiple regression. Students undertake substantive research projects, requiring lab instruction in the use of the computer in quantitative applications of political science research."

By the end of this course, students should be able to:

- Become familiar with basic quantitative methods common in political science
- Critically read political science research
- Have a foundation for the understanding of statistics and statistical analysis
- Understand and conduct bivariate hypothesis testing
- Understand the basics of linear regression, including the assumptions behind the model
- Diagnose violations of the assumptions of linear regression
- Use R to conduct basic hypothesis testing and data management

Prerequisites

No prerequisites are required for this course. However, the Scope and Methods course is a co-requisite. This course will be taught in concert with the other.

Required Texts

- Gujarati, Damodar N. and Dawn C. Porter *Basic Econometrics, 5th ed.*. 2008. New York:McGraw-Hill Irwin.
- Harris, Jenine K. *Statistics with R: Solving Problems Using Real-World Data*. 2021. Los Angeles: Sage.

Software

For your homework in this class and many class examples, you will be required to work in R, a free, open-source statistical program. R is a very flexible program that is gaining in popularity in political science. However, I will also be demonstrating statistical analysis in Stata. You can download R:

- R: https://cran.r-project.org

I will also be doing some examples of the type-setting software, LaTeX. This is also a free, open-source software that can create professional tables and integrates nicely with R. Your assignments will be required to be in LaTeXafter October 1st. You can use LaTeXthrough an online interface called Overleaf. You can create an Overleaf account here:

- Overleaf: https://www.overleaf.com

The second statistical software that you will have available to you is Stata. The department will provide everyone a copy of Stata the first week you are here. I will be running some examples in Stata to introduce you to the program. However, assignments should all be completed in R.

Communication

This semester is going to be unique to say the least. Because of this, communication will be very important. Please feel free to contact me as much as you need. You can email me at the email above. I will also have office hours set up for one hour after lab on Tuesdays. I will be on Zoom, so you will just need to send an invitation. Any communication from me will be through your official CU email unless you specify otherwise. I will also be using Canvas heavily to post readings and assignments. Additionally, you will be turning in assignments on Canvas (let's save some trees).

In the event that this course moves completely online, communication will be even more important. Please let me know if you need any clarifications on logistical or substantive matters, please email me or ask in class.

Office Hours

This semester, I have dedicated office hours only to PSCI 7085. These will be directly after your Lab, from 9:30am to 11:00am on Tuesdays. As you know, we cannot have in person office hours in offices due to space/ventilation concerns. However, I will be available via Zoom OR (weather

permitting), I will be sitting outside in the courtyard between Ketchum and Norlin Library. This is time dedicated to helping with your projects or your problem sets. No appointment is necessary, just drop in (or just send a Zoom invitation). Details to follow in class.

Grades

Grades will be determined based on the following assignments:

1. **Exams (35%)** In the course of this semester, you will have two take-home exams that you will have one week to complete and turn in online in a Canvas dropbox. The midterm will cover the first 7 weeks of material and the final exam will be cumulative with an emphasis on the second half of the material covered in class. These exams will include both theoretic and applied concepts, with short answer, essay, and data analysis.
2. **Problem Sets (20%)** You will have 9 problem sets this semester. Most of these problem sets will have you apply concepts learned in class. Other problem sets will pertain to your final paper, helping you get started early on the data analysis.
3. **Prospectus (5%)** One assignment this semester will be a prospectus, or a plan for your final paper. This assignment will be the basis for an assignment due soon after in Scope and Methods.
4. **Final Paper (30%)** The main assignment in this class is a full length research article with a quantitative analysis included. This paper is written in conjunction with Dr. Anand Sokhey in your PSCI 7075: Scope and Methods of Political Science course. You will be working with both of us on this project. In the end, that paper should include the following components:
    - A clear research question
    - A literature review sorted thematically
    - A testable hypothesis
    - A description of the data and methods used to test hypothesis
    - An analysis to test the hypothesis
5. **Participation (10 %)** This course is split into two parts: lecture and lab. Your attendance is expected in both. You will also be expected to participate in class discussions. Studies have consistently shown that students learn better when actively engaged in class. However, current circumstances (i.e. a global pandemic) might keep you from attending class in person. I am working to get a lecture capture so you can watch class either at the same time or later. However, for your participation grade, you can turn in a 2 page (single-spaced) summary of the day's readings (if more than one reading is required, I expect this summary to be a synthesis of all the reading, not a reading by reading summary) and include 2 questions at the end. This alternative assignment is due the day of class. I just ask that you let me know in advance that you cannot attend class for any reason.
6. **Poster Session**: In the last week of classes, you will present a poster you make for your final paper. You will present your poster online in Zoom. Many people usually attend this

event (grad students and faculty alike). This is a great time to practice your presentation skills and to get feedback on your project.

You will also have several assignments in your Scope and Methods course that deal with the paper that is due in both classes. While they do not factor explicitly into your grade in this course, I will also be reviewing these assignments such as your abstracts, outline, and poster presentation.

Grade Scale

A (95-100); **A-** (90-94); **B+** (87-89); **B** (84-86); **B-** (80-83); **C+** (77-79); **C** (74-76); **C-** (70-73); **D+** (67-69); **D** (64-66); **D-** (60-63); **F** (0-59)

Course Schedule

The schedule is tentative and subject to change. This schedule is for the Lecture portion of course alone. The Lab Schedule is in a separate document.

Some important dates are:

- October 1: Abstracts Due
- October 14: Midterm Due
- October 28: Paper Prospectus Due
- November 10: Outline Due
- November 25: Final Exam Due
- December 1: Poster Session
- December 11: Final Paper Due (5pm)

Week 1: Introduction

August 26

Reading:

- Roberts, Margaret E. 2018. "What is Political Methodology. *PS: Political Science and Politics*
- King, Gary. 1990. "On Political Methodology". *Political Analysis* 2(1): 1-29.
- The Syllabus

Week 2: Dealing with Data

September 2

Reading:

- H Chapter 1
- CU Library Guide https://libguides.colorado.edu/c.php?g=411087&p=2864337

Assignment Due:

- Survey

Week 3: Describing Data

September 9

Reading:

- H Chapter 2 and 3

Assignment Due:

- Problem Set 1

Week 4: Probability and Statistical Inference

September 16

Reading:

- G & P Appendix A (skim)
- A & F Chapters (PDF on Canvas)
- H Chapter 4

Assignment Due:

- Problem Set 2

Week 5: Null Hypothesis Significance Testing

September 23

Reading:

- Siegfried, Tom. 2010. "Odds are, it's wrong: Science Fails to Face the Shortcomings of Statistics". `ScienceNews` 177(7):26–29.
- King, Gary. 1995. "Replication, Replication". *PS: Political Science and Politics* 28(3): 444-452.
- H Chapter 6 (as an example)

Assignment Due:

- Problem Set 3

Week 6: Bivariate Hypothesis Tests

September 30

Reading:

- H Chapters 5, 6, 7 and 8 (feel free to skim)

Assignment Due:

- Problem Set 4

Week 7: Theory of Bivariate Regression

October 7

Reading:

- G & P Chapters 2 and 3

Assignment Due:

- Problem Set 5

Week 8: Bivariate Regression, Estimation and Inference

October 14

Reading:

- G & P Chapters 4 and 5
- H Chapter 5 (pp. 521-562)

Assignment Due:

- Take-Home Midterm

Week 9: Multiple Regression, Estimation and Inference

October 21

Reading:

- G & P Chapters 7 and 8
- H Chapter 5 (pp. 581-605)

Assignment Due:

- Problem Set 6

Week 10: Regression with Categorical Variables

October 28

Reading:

- G & P Chapter 9 (pp. 277-285)

Assignment Due:

- Paper Prospectus

Week 11: Interactions

November 4

Reading:

- Brambor, Thomas, William Roberts Clark, and Matt Golder. 2006. "Understanding Inter- action Models: Improving Empirical Analyses." *Political Analysis*. 14:63–82.

Assignment Due:

- Problem Set 7

Week 12: Model Assumptions, Diagnostics, and Fixes Part I

November 11

Reading:

- G & P Chapters 10 and 11
- H Chapter 5 (pp. 563-580)

Assignment Due:

- Problem Set 8

Week 13: Model Assumptions, Diagnostics, and Fixes Part II

November 18

Reading:

- G & P Chapter 12 and 14

Assignment Due:

- Problem Set 9

Week 14: Building on the Basic OLS Model

November 25

Reading:

- G & P Chapter 15
- H Chapter 10

Assignment Due:

- Take Home Final Exam

END OF IN PERSON INSTRUCTION

Week 15: Presenting Model Results

December 2

Reading:

- Kastellec, Jonathon P. and Eduardo L. Leoni. 2007. "Using Graphs Instead of Tables in Political Science". *Perspectives on Politics* 5(4): 755-771.

FINAL PAPER DUE FRIDAY DECEMBER 11 at 5PM

University of Colorado Policies

Classroom Behavior

Both students and faculty are responsible for maintaining an appropriate learning environment in all instructional settings, whether in person, remote or online. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. For more information, see the policies on classroom behavior and the Student Code of Conduct.

Requirements for COVID-19

As a matter of public health and safety due to the pandemic, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements, and public health orders in place to reduce the risk of spreading infectious disease. Required safety measures at CU Boulder relevant to the classroom setting include:

- maintain 6-foot distancing when possible,
- wear a face covering in public indoor spaces and outdoors while on campus consistent with state and county health orders,
- clean local work area,
- practice hand hygiene,
- follow public health orders, and
- if sick and you live off campus, do not come onto campus (unless instructed by a CU Healthcare professional), or if you live on-campus, please alert CU Boulder Medical Services.

Students who fail to adhere to these requirements will be asked to leave class, and students who do not leave class when asked or who refuse to comply with these requirements will be referred to Student Conduct and Conflict Resolution. For more information, see the policies on COVID-19 Health and Safety and classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please see the "Accommodation for Disabilities" statement on this syllabus.

Before returning to campus, all students must complete the COVID-19 Student Health and Expectations Course. Before coming on to campus each day, all students are required to complete a Daily Health Form. In this class, you may be reminded of the responsibility to complete the Daily Health Form and given time during class to complete it.

Students who have tested positive for COVID-19, have symptoms of COVID-19, or have had close contact with someone who has tested positive for or had symptoms of COVID-19 must stay home and complete the Health Questionnaire and Illness Reporting Form remotely. In this class, if you are sick or quarantined, contact the instructor to inform her of your absence (you don't

need to tell me the exact nature of your illness). Keep on top of your assignments as much as possible, and complete the day's in-class work at home, then submit it on campus.

Accommodation for Disabilities

If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities in the academic environment. Information on requesting accommodations is located on the Disability Services website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition, see Temporary Medical Conditions on the Disability Services website.

Preferred Student Names and Pronouns

CU Boulder recognizes that students' legal information doesn't always align with how they identify. Students may update their preferred names and pronouns via the student portal; those preferred names and pronouns are listed on instructors' class rosters. In the absence of such updates, the name that appears on the class roster is the student's legal name.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the Honor Code. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, submitting the same or similar work in more than one course without permission from all course instructors involved, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code (honor@colorado.edu); 303-492-5550). Students found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code as well as academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found at the Honor Code Office website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to fostering an inclusive and welcoming learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, or protected-class discrimination or harassment by members of our community. Individuals who believe they have been subject to misconduct or retaliatory actions for reporting a concern should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127 or cureport@colorado.edu. Information about the OIEC, university policies, anonymous reporting, and the campus resources can be found on the OIEC website.

Please know that faculty and instructors have a responsibility to inform OIEC when made aware of incidents of sexual misconduct, dating and domestic violence, stalking, discrimination, harassment and/or related retaliation, to ensure that individuals impacted receive information about options for reporting and support resources.

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, please inform me via email with at least one week's notice. We can then find the best accommodation. See the campus policy regarding religious observances for full details.