

PSCI 7085: Introduction to Political Science Data Analysis

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Class Hours: T 3:30-6:00

Class Room: Ketchum 1B31

Lab Hours: W 4:30pm-5:20pm

Course Description¹

7085 – more commonly called “Data I” – is a foundational course here at CU, just as it is in most graduate programs. The course is intended to help you develop/strengthen the quantitative methodological skills that you will use regularly as a professional social scientist.

The CU Boulder Course Catalogue notes that the course “[p]rovides 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 fall you should be able to:

- express familiarity with essential quantitative methods common in political science.
- (more) effectively read and critique political and social science research
- articulate the intuition and theory underpinning statistics and statistical analysis
- understand and conduct bivariate hypothesis testing
- understand the basics and assumptions of linear regression
- diagnose violations of regression assumptions
- conduct basic hypothesis testing and manage data in the R statistical environment.

¹Thanks to Dr. Sarah Hunter for sharing her materials—this course follows her syllabus and general approach.

Prerequisites

This course has no prerequisites. However, the Scope and Methods (PSCI 7075) course is a co-requisite, and the two courses are coordinated with one another. Some assignments will require that you draw upon the progress you are making in 7075.

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 class assignments and class examples, you will be required to work in R — a free, open-source statistical program (some call it a statistical environment). R is very flexible program, and has gained substantial popularity in political science and across the social sciences. However, I will also do some demonstration of statistical analysis in *Stata*. You can download R at:

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

I will also be providing examples of the type-setting software, $\text{\LaTeX}$ —in fact, this syllabus was written in $\text{\LaTeX}$. “Tex” is also a free, open-source environment for typesetting documents; it can create professional tables and integrates nicely with R. After October 1st, I’ll ask that your assignments be written in $\text{\LaTeX}$. You can use Tex through an online interface called Overleaf. Create an account at:

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

The department will provide everyone a copy of *Stata* within the first weeks of your arrival. I will be running some examples in *Stata* to introduce you to the program. However, assignments should all be completed in R.

Communication

Please feel free to contact me via the email address provided. I will hold office hours on Wednesday afternoons, sometimes in-person and sometimes over Zoom. If you cannot make my regular office hours, I’m happy to find another time to meet with you.

Communication from me will be through your official CU email and CU-sanctioned online portals. I will also use Canvas to post readings and assignments, and you will upload your assignments on that site.

Office Hours

My office hours will take place on Wednesday afternoons, from 1:00-3:00 pm. Some weeks these will be in-person, and some weeks these will take place on Zoom. I'm also happy to find another time to meet with you (likely over Zoom) if the regularly scheduled office hours will not work.

Grades

Grades will be determined based on the following assignments:

1. **Exams (30%)** Over the course of the semester, we will have two take-home exams – for each, you will have one week to complete and turn it in via Canvas. The midterm will cover roughly the first 7 weeks of material; the final exam will be cumulative, with an emphasis on the material covered in the second half of the class. The exams will include both theoretic and applied concepts, and will contain short answer items, essays, and data analysis sections.
2. **Problem Sets (20%)** You will have 8 problem sets this semester. Most of these will have you apply concepts learned in class, though some will pertain to your final paper (by helping you get started early on the data analysis, etc.).
3. **Prospectus (5%)** One assignment this semester will be a prospectus that serves as a plan for your final paper. This assignment will be the basis for an assignment due in Scope and Methods.
4. **Final Paper (30%)** The main assignment in this class is a full length research article featuring a quantitative analysis. This paper will be written in conjunction with Dr. Meg Shannon's PSCI 7075: Scope and Methods of Political Science course. You will be working with both of us on this project, and in the end that paper should include the following:
 - A clear research question
 - A literature review
 - A testable hypothesis
 - A description of the data and methods used to test the hypothesis
 - An analysis to test the hypothesis
5. **Participation (10%)** This course contains both lecture and lab, and your attendance is expected in both. You will also be expected to participate in class discussions. Please let me know in advance if you cannot attend class for any reason.
6. **Poster Session (5%)**: In the last week of classes you will present a poster relating to the final project you have developed across 7075 and 7085. This session is usually attended by much of the department, and is a great time to practice your presentation skills and to get feedback.

Note: You will have several assignments in Scope and Methods that relate to the semester-long paper-project. While these assignments do not factor explicitly into your grade in 7085, I will

also be reviewing these assignments (e.g., your abstracts).

Grade Scale

A (94-100); **A-** (90-93); **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:

- Late Sept.: Abstracts Due (see 7075 syllabus)
- October 11: Midterm Due
- November 1: Paper Prospectus Due
- November 14: Outline Due (7075)
- December 5: Poster Session
- December 8: Final Exam Due
- December 12: Final Paper Due (5pm)

Week 1: Introduction

August 23

Suggested 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

August 30

Reading:

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

Assignment Due:

- Data Set Overviews (see Week 1 slides)

Week 3: Describing Data

September 6

Reading:

- H Chapter 2 and 3

Assignment Due:

- Problem Set 1

Week 4: Probability and Statistical Inference

September 13

Reading:

- G & P Appendix A (skim)
- H Chapter 4

Assignment Due:

- Problem Set 2

Week 5: Null Hypothesis Significance Testing

September 20

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 27

Reading:

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

Assignment Due:

- Problem Set 4

Week 7: Theory of Bivariate Regression

October 4

Reading:

- G & P Chapters 2 and 3

Assignment Due:

- Problem Set 5

Week 8: Bivariate Regression, Estimation and Inference

October 11

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 18

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 25

Reading:

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

Week 11: Interactions

November 1

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
- Paper prospectus due

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

November 8

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 15

Reading:

- G & P Chapter 12 and 14

Week 14: Fall Break

Week 15: Building on the Basic OLS Model

November 29

Reading:

- G & P Chapter 15
- H Chapter 10

Week 16: Presenting Model Results

December 6

Reading:

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

Assignment Due:

- Take Home Final Exam Due Thursday, Dec. 8th, 5PM

FINAL PAPER DUE MONDAY DECEMBER 12 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 classroom behavior policy, the Student Code of Conduct, and the Office of Institutional Equity and Compliance.

Requirements for COVID-19

As a matter of public health and safety, all members of the CU Boulder community and all visitors to campus must follow university, department and building requirements and all public health orders in place to reduce the risk of spreading infectious disease. CU Boulder currently requires COVID-19 vaccination and boosters for all faculty, staff and students. Students, faculty and staff must upload proof of vaccination and boosters or file for an exemption based on medical, ethical or moral grounds through the MyCUHealth portal.

The CU Boulder campus is currently mask-optional. However, if public health conditions change and masks are again required in classrooms, students who fail to adhere to masking 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 policy on classroom behavior and the Student Code of Conduct. If you require accommodation because a disability prevents you from fulfilling these safety measures, please follow the steps in the “Accommodation for Disabilities” statement on this syllabus.

If you feel ill and think you might have COVID-19, if you have tested positive for COVID-19, or if you are unvaccinated or partially vaccinated and have been in close contact with someone who has COVID-19, you should stay home and follow the further guidance of the Public Health Office (contacttracing@colorado.edu). If you are fully vaccinated and have been in close contact with someone who has COVID-19, you do not need to stay home; rather, you should self-monitor for symptoms and follow the further guidance of the Public Health Office (contacttracing@colorado.edu).

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 Honor Code may include, but are not limited to: 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 Student Conduct Conflict Resolution (honor@colorado.edu); 303-492-5550). Students found responsible for violating the Honor Code will be assigned resolution outcomes from the Student Conduct Conflict Resolution as well as be subject to academic sanctions from the faculty member. Additional information regarding the Honor Code academic integrity policy can be found on the Honor Code website.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

CU Boulder is committed to fostering an inclusive and welcoming learning, working, and living environment. University policy prohibits sexual misconduct (harassment, exploitation, and assault), intimate partner violence (dating or domestic violence), stalking, protected-class discrimination and harassment, and related retaliation by or against members of our community on- and off-campus. These behaviors harm individuals and our community. The Office of Institutional Equity and Compliance (OIEC) addresses these policies, and individuals who believe they have been subjected to misconduct can contact OIEC at 303-492-2127 or email cureport@colorado.edu. Information about university policies, reporting options, and support resources can be found on the OIEC website.

Please know that faculty and graduate instructors have a responsibility to inform OIEC when they are made aware of any issues related to these policies regardless of when or where they occurred to ensure that individuals impacted receive information about their rights, support resources, and resolution options. To learn more about reporting and support options for a variety of concerns, visit Don't Ignore It.

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.