

POLSCI 3325G: Methods II - Data Science Winter, 2026

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1 Overview and Course Objectives

Welcome to the data science course! As the very first order of business, I want to take the opportunity to assure you that this class is neither a class that is heavily mathematical (you will not need much, if anything, beyond arithmetic) nor one that is largely about programming (the software we will use is point-and-click-ish). You are all here as Political Science majors because you are interested in some aspect of politics (e.g., voting, wars, polarization, human rights). These interests might be deep-seated or relatively new but are often related to closely held values and beliefs about rights, duty, representation, and freedom. It may seem as though we do our best throughout your undergraduate education to subjugate these interests and beliefs to a more clinical and systematic study of theories and approaches. In fact, our goal is quite the opposite. We want to give you the tools to dig deeper and gain a more nuanced understanding of the causes and consequences of the socio-political phenomena that interest you most. This class has a similar goal.

We hope to get you thinking about how data are used to make social, political and economic decisions and how we can answer questions we care about with data. The time when political scientists could happily exist in a world theoretical arguments and data-free speculation has long since passed. We live in a world where many decisions are made using data. This has a number of interesting implications.

1. It is incumbent on those of us who wish to be savvy consumers to understand how data are being used to make decisions and how to discriminate good from bad uses of data.

2. We have to have some basic understanding of research design and probability to evaluate advances in health, medicine, politics, economics, etc... When looking at media reports of studies, how can we figure out whether the study was done well or poorly? Does the study generalize? What actionable intelligence really exists?
3. As political scientists, we answer questions about policy effectiveness, the efficacy of citizen interactions with government, etc... with data. But, we need to know and understand how to do this.

One of the interesting aspects of how stats courses (particularly those in the social sciences) have evolved is that they often continue to be perceived as “math classes.” One of my goals here is to (mostly) disabuse you of this notion. This is largely not a math class. That is to say, we will be *doing* (in terms of paper and pencil) very little math. We may *look at* mathematical notation from time to time. We use mathematical notation because it is precise - with terms and operators defined, we could all look at an equation and understand its main components and how they fit together. Mathematical notation gives us a common foundation for shared scientific communication. As Galileo said, “Mathematics is the language with which God has written the universe”. Similarly, mathematical notation is concise - it allows us to represent some quite abstract and complicated ideas in relatively little space.

Instead of thinking about this as a math class, this is a class that is part psychology, part story-telling, part visual design and part data analysis (obviously). Statistics in the social sciences are often (as in this course) focused on applications rather than complicated mathematical derivations.

2 Course Text(s)

All readings will be provided on the Course’s OWL page.

3 Requirements

The course has a number of requirements, including reading, applied work and essays of different sorts. Here is a breakdown of the different elements:

Cheat Sheet 10 points

It is important to keep track of what we’ve been doing and to have some understanding of how the pieces fit together. A cheat sheet is a great way to identify the most important aspects of the reading and lecture. Each week, you will synthesize the information you read about and learned into a cheat sheet that evolves throughout the semester. The cheat sheet that covers the previous Tuesday’s class will be due on Thursday night at 11:59 Eastern Time with a three-day “no-late-penalty period” extending to Sunday at 11:59 PM Eastern Time. The cheat sheet you submit each week should contain the new material you learned and the material from the

previous week(s). The OWL site has a template either in Powerpoint or Keynote (choose as you like). Turning in the cheat sheet with new, relevant information on it will earn you a point. Failing to turn it in or turning it in without updating will earn you 0 points for that week.

Homework 30 points

There will be three applied data homework assignments that will require you to complete and describe some data analysis task. More details on these assignments when they are assigned. Homework assignments will be due on Feb 2, 2026, March 9, 2026; and March 30, 2026 - all at 11:59 PM and all will have a five day “no-late-penalty” period so they can be turned in without penalty until Feb 7, March 14 and April 4, respectively. Submissions after the no-late-penalty period will be marked down 1 point (out of 10) per day. The homework assignment instructions will be available at least one week prior to the due date. Each homework assignment will be worth 10 points.

Essays 30 points

This is an essay course and as such you are required to write 2500 words with argumentation and evidence presented in connected prose. There will be three short essays (800-1,000 words each) assigned throughout the semester. The essays will be due on Feb 23, 2026, March 16, 2026; and April 6, 2026 - all at 11:59 PM and all will have a five day “no-late-penalty” period so they can be turned in without penalty until Feb 28, March 21 and April 11, respectively. Essays submitted after the no-late-penalty period will be marked down one point (out of 10) per day. The essay instructions will be available at least one week prior to the due date. Each essay will be worth 10 points.

In-class Final Exam 30 points

There will be an in-person final exam during the final exam period. The final exam will be closed-book, hand-written on paper and you will be able to have a summary sheet available, but no other notes or resources.

4 Absences, Late Assignments and Makeups

I will follow the guidelines for accommodations posted at the Office of the Registrar.

5 Generative AI

We will discuss and firm up the AI use policy on the first day of class. I will update the syllabus with details at that time.

6 Academic Offenses

I will follow the University's policies on plagiarism and other academic misconduct. The Department of Political Science has a useful discussion of those policies you can view if you like.

7 Course Outline

The course will meet from 1:30-3:30 PM on Tuesdays. The course will comprise lectures, group discussions and applied activities. Attendance is mandatory. As such a laptop computer capable of installing software such as Microsoft Excel and Tableau is required.

The outline below gives the readings and other assignments that should be done before coming to class that day. Many of the course readings are identified below. From time to time, I may assign other readings that will be posted to the course's OWL site.

Week1 (1/6)

- Introduction

Week 2 (1/13)

- What are data?
- Where do we find data?
- Levels of measurement - different kinds of variables.
- Readings:
 - Haan and Godley: Chapters 1 & 2

Week 3 (1/20)

- Data Visualization.
- Readings
 - Cleveland and McGill (1985) - "Graphical Perception and Graphical Methods for Analyzing Scientific Data"
 - Heer and Bostock (2010) - "Crowdsourcing graphical perception: using mechanical turk to assess visualization design"
 - <https://blog.hurree.co/this-psychology-principle-will-make-your-dashboards-more-powerful> Gestalt Principles in Visualization

Week 4 (1/27)

- Using Microsoft Excel for Making Graphs.
- Readings
 - Data Visualization in Excel: A guide for beginners: Chapters 1- 4.

Week 5 (2/3)

- Measures of Centre and Spread
- Pivot tables in Excel
- Readings:
 - Microsoft Excel Pivot Table Data Crunching Chapters Introduction - 3.
 - Haan and Godley Chapters 6 & 7

Week 6 (2/10)

- Statistics and Inference
- Statistical Calculations in Pivot Tables
- Readings:
 - Haan and Godley: Chapters 4 & 5.
 - Microsoft Excel Pivot Table Data Crunching Chapters 4 & 5.

Reading Week - No Class (2/17)**Week 7 (2/24)**

- Differences Between Groups
- Inference in Pivot Tables
- Readings:
 - Haan and Godley: Chapters 8-11.

Week 8 (3/3)

- Frequency Distributions and Contingency Tables
- Contingency Tables in Excel
- Readings:
 - Haan and Godley - Chapter 12.

Week 9 (3/10)

- Analytics in Tableau
- Readings
 - Visual Analytics with Tableau Chapters 1-4, Chapter 10.

Week 10 (3/17)

- Maps and Geographic Data
- Readings
 - Visual Analytics with Tableau Chapters 6.

Week 11 (3/24)

- Tableau Dashboards I
- Readings:
 - Visual Analytics with Tableau Chapters 8.
 - Tableau 10 Bootcamp: Chapters 1-2.

Week 12 (3/31)

- Tableau Dashboards II
- Readings:
 - Tableau 10 Bootcamp: Chapters 3,4,6,7.

Week 13 (4/7)

- Tableau Dashboards III
- Readings:
 - Visual Analytics with Tableau Chapters 9.
 - Tableau 10 Bootcamp: Chapters 8,10.

Final Exam

- In-person exam time and date TBD.