

Public Policy 529.001: Statistics – Standard Sequence Fall 2023 Syllabus

Instructor: Professor Catie Hausman, chausman@umich.edu

4215 Weill Hall

Office hours (stop by to ask questions, talk about class, or anything else – no sign-up needed):

- Mondays 3-4 and Wednesdays 9-10

Graduate student instructor (GSI):

Gabe Baskin, baskin@umich.edu

Office location and office hours: TBD

Class meeting schedule: Mondays and Wednesdays, 1:00 - 2:20 pm in 1120 Weill Hall.

Section meetings: Fridays, 10:00 - 11:20 am in 1120 Weill Hall.

Overview

Policy makers have long relied on quantitative analysis to inform their decision-making, and recent advances in data gathering and in computing have made quantitative analysis even more prevalent. The goal is for you to be able to ask critical questions when presented with quantitative analysis and to help guide the quantitative analysis at policy organizations.

Examples of the kinds of policy questions we might ask: How is income distributed across individuals in the US, how has this changed over time, and how can this information best be summarized and communicated? What do hospitalization rates mean for vaccine efficacy? How might we measure the effectiveness of something like a new tutoring program, and what limitations are there with our measurement and estimation strategies?

Our goals are to:

- **Think critically about how data-informed analysis is presented**
- **Understand the basics of mathematical foundations for statistical analysis**
- **Develop excellence in incorporating quantitative data analysis into our policy reasoning**

Reading reflections

For every day that has an assigned reading, there is a reading reflection due at the start of class. In this reading reflection, you will summarize (in one sentence) the main point of the readings for the day. Then (in one more sentence), you will write one thing that surprised you, or you found helpful, or connected to a policy interest of yours, or connected to another course you are taking, or connected to something in the news. Finally, you will list one question or doubt you have remaining.

Reading reflections are due in-person at the start of the class, and late reflections will not be accepted, because we will use them during class. Reflections will be graded on a 1 (minus), 2 (check), 3 (plus) basis.

I will drop your two lowest reading reflection scores.

Participation

The success of this semester depends on your active engagement with course material both outside the classroom (e.g. with reading reflections and problem sets) and in the classroom (via participation). Participation will be assessed via iClicker scores and other in-class exercises, where the emphasis is on *trying* rather than on *correct answers*. If you are absent (e.g. because you are quarantining), you can watch the recorded lecture and contribute to the online discussion board within one week of the lecture. You can do this two times during the semester for full credit; see me if you need to be absent more than twice.

Textbook and readings

We will rely on *Essential Statistics for Public Managers and Policy Analysts* (4th Edition) by Evan Berman and Xiaohu Wang. We will also use *The Art of Statistics* by David Spiegelhalter. These two books are required. I will post supplemental readings on Canvas. Let me know if the cost of the books is prohibitive for you.

There are many good online resources with alternative explanations of statistical concepts, with example data exercises, with simulation apps, etc. Feel free to use these in addition to the required readings, and let me know if you find something especially helpful. Some examples:

<https://www.openintro.org/book/os/>

<https://openstax.org/details/books/introductory-statistics>

https://saylordotorg.github.io/text_introductory-statistics/

Note we will skip some of BW: Chapters 4, 9, 13, and 15-17. Chapters 4 and 9 we will replace with our own updated policy applications. Chapters 15-17 significantly overlap with the material for PubPol 639: Program Evaluation.

Statistical software

At the end of the semester, we will devote several weeks to applying our ideas to our own data analysis using the statistical software Stata. I will provide resources for learning the software.

iClickers

We will use iClickers during class. The Ford School is making this technology available free to all students. More information to follow.

Problem sets

Throughout the semester we will have written assignments to practice applying concepts, formulas, interpretation, and coding to real-world data. Problem sets are due at the start of the class, and late submissions will not be accepted, because we may occasionally use them during class and I will immediately post answer keys.

I will post answer keys so that you can work together through mistakes you made. Use the answer keys to assess your own progress, and follow up with me and the GSIs for any clarifications. I can only post these if you agree to not circulate them to students in future years, not post them anywhere online, etc.

You are encouraged to collaborate with other students to figure out how to answer questions on the problem sets. It is essential, however, that you write up all of your answers independently and in your own words.

Any requests for grade changes on any assignment must be submitted in writing. Your request must provide a detailed rationale behind your request for a re-evaluation of the grade. Note the entire assignment will be re-graded by the instructor. Consequently, the re-graded score may be lower than, equal to, or higher than the original score.

I will provide an extra credit opportunity to replace your lowest problem set score.

Check-in quizzes and exams

Quizzes will be on September 25 and November 8. These quizzes are designed to ensure that you are keeping up with the material between the two exams. The midterm exam will be on Wednesday, October 18, and the final exam will be on Wednesday, December 13, 4:00 pm - 6:00 pm.

Summary of course components

Your overall grade for this course will be determined by the following:

- Reading reflections 10%
- Participation 5%
- Problem sets 25%
- Check-in quiz 1 10%
- Midterm 20%
- Check-in quiz 2 10%
- Final exam 20%

The final course letter grade reflects the Ford School's guidelines. An A is awarded for work that is Excellent, an A- for work that is Very Good, a B+ for work that is Good, a B for work that is Acceptable, and a B- for work that is below expectations for graduate work.

Use of AI

Generative artificial intelligence is evolving rapidly, and in principle might help you with some aspects of this course. You are welcome to use AI tools to explore the field, play with knowledge, and help you study. But note: (1) You need to be open about this and document your use. (2) Ultimately, you must take full responsibility for AI-generated materials: ideas should be attributed and facts should be true. And (3) This course's assignments are designed to help you practice and understand and memorize material – over-use of AI may thus inhibit your learning and long-term retention of the material.

You may not use generative AI tools for your reading reflections, as those are intended to be your own personal reflection. If you use generative AI to assist you with problem sets, you should include in your write-up what prompt you use, and you should verify that the AI output is mathematically and factually correct and complete. When we begin coding camp, we will discuss the use of AI for assisting with statistical software.

If you are struggling

Communicate with me early and often. Seek help so we can work together to strengthen your learning experience.

Modality

Lectures, including quizzes and exams, will be held in-person in Weill Hall unless public health measures put in place by the Ford School mandate otherwise. My assumption is that you will attend in-person classes unless you communicate otherwise to me and to Student Services. I expect some of you will need to self-isolate at points in the semester (see the Public Health Protection Policy below). I will be flexible in response to these concerns, so please communicate with me and with the GSI so that we can help you succeed in the course.

Ford School inclusivity statement

Members of the Ford School community represent a rich variety of backgrounds and perspectives. We are committed to providing an atmosphere for learning that respects diversity. While working together to build this community we ask all members to:

- share their unique experiences, values and beliefs
- be open to the views of others
- honor the uniqueness of their colleagues
- appreciate the opportunity that we have to learn from each other in this community
- value one another's opinions and communicate in a respectful manner
- keep confidential discussions that the community has of a personal (or professional) nature
- use this opportunity together to discuss ways in which we can create an inclusive environment in Ford classes and across the UM community

Ford School public health protection policy

In order to participate in any in-person aspects of this course--including meeting with other students to study or work on a team project--you must follow all the public health safety measures and policies put in place by the State of Michigan, Washtenaw County, the University of Michigan, and the Ford School. Up to date information on U-M policies can be found at <https://campusblueprint.umich.edu/>. It is expected that you will protect and enhance the health of everyone in the Ford School community by staying home and following self-isolation guidelines if you are experiencing any symptoms of COVID-19.

Student mental health and wellbeing

The University of Michigan is committed to advancing the mental health and wellbeing of its students. We acknowledge that a variety of issues, both those relating to the pandemic and other issues such as strained relationships, increased anxiety, alcohol/drug problems, and depression, can directly impact students' academic performance and overall wellbeing. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available.

You may access the Ford School's embedded counselor Paige Ziegler (contact information TBD) and/or counselors and urgent services at Counseling and Psychological Services (CAPS – <https://caps.umich.edu/>) and/or University Health Service (UHS – <https://www.uhs.umich.edu/mentalhealthsvcs>). Students may also use the Crisis Text Line (text '4UMICH' to 741741) to be connected to a trained crisis volunteer. You can find additional resources both on and off campus through the University Health Service (<https://uhs.umich.edu/stressresources>) and through CAPS (<https://caps.umich.edu/article/um-mental-health-resources>).

Accommodations for students with disabilities

The University of Michigan recognizes disability as an integral part of diversity and is committed to creating an inclusive and equitable educational environment for students with disabilities. Students who

are experiencing a disability-related barrier should contact Services for Students with Disabilities (<https://ssd.umich.edu/>; 734-763-3000 or ssdoffice@umich.edu). For students who are connected with SSD, accommodation requests can be made in Accommodate. If you have any questions or concerns please contact your SSD Coordinator or visit SSD's Current Student webpage. SSD considers aspects of the course design, course learning objects and the individual academic and course barriers experienced by the student. Further conversation with SSD, instructors, and the student may be warranted to ensure an accessible course experience.

Academic integrity

The Ford School academic community, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. We hold all members of our community to high standards of scholarship and integrity. To accomplish its mission of providing an optimal educational environment and developing leaders of society, the Ford School promotes the assumption of personal responsibility and integrity and prohibits all forms of academic dishonesty, plagiarism and misconduct. Academic dishonesty may be understood as any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. Plagiarism involves representing the words, ideas, or work of others as one's own in writing or presentations, and failing to give full and proper credit to the original source. Conduct, without regard to motive, that violates the academic integrity and ethical standards will result in serious consequences and disciplinary action. The Ford School's policy of academic integrity can be found in the MPP/MPA, BA, and PhD Program handbooks (e.g. <https://www.dropbox.com/s/wuq2jfmbpflm4f2/FINAL%202023%20Masters%20Handbook.pdf>). Additional information regarding academic dishonesty, plagiarism and misconduct and their consequences is available at: <https://rackham.umich.edu/academic-policies/section8/#112>

Use of technology

There is very good [evidence](#) that laptops and tablets make it harder to learn for many people. **As a result, I do not generally allow laptops, phones, or other screens in the classroom.** Do let me know if you require a laptop, for instance because of SSD accommodations.

Students should follow instructions from their instructor as to acceptable use of technology in the classroom, including laptops, in each course. All course materials (including slides, assignments, handouts, pre-recorded lectures or recordings of class) are to be considered confidential material and are not to be shared in full or part with anyone outside of the course participants. Likewise, your own personal recording (audio or video) of your classes or office hour sessions is allowed only with the express written permission of your instructor. If you wish to post course materials or photographs/videos of classmates or your instructor to third-party sites (e.g. social media), you must first have informed consent. ***Without explicit permission from the instructor and in some cases your classmates, the public distribution or posting of any photos, audio/video recordings or pre-recordings from class, discussion section or office hours, even if you have permission to record, is not allowed and could be considered academic misconduct.***

Please review additional information and policies regarding academic expectations and resources at the Ford School of Public Policy at: <https://intranet.fordschool.umich.edu/academic-expectations>

August 28 – Monday: Intro to the course

August 30 – Wednesday: Why statistics?

Required readings:

- BW Chapter 1
- Choose one of: John Oliver's (2016) "Scientific Studies" video (<https://www.youtube.com/watch?v=0Rnq1NpHdmw>, warning, rated R) or Harford (2018) "Statistics, Thinking Fast and Slow" article

Optional readings:

- "W. E. B. Du Bois's Data Portraits" video (<https://www.youtube.com/watch?v=gr9l7GX9Qsk>, especially starting 3:44)

September 4 – Monday: No class (Labor day)

September 6 – Wednesday: Research design and causality

Required readings:

- BW Chapter 2
- Dynarski et al. article "Closing the Gap": just read pages 1721-1724, and Figure 4 on page 1736

Optional readings:

- Kellstedt and Whitten chapter on research design

September 11 – Monday: Conceptualization and measurement

Required readings:

- BW chapter 3
- Petrovnia (2021) "Crash Course Thread on Writing Gender Questions"

Optional readings:

- Mithani and Samuels (2021) from 538.com on "Who The Census Misses"
- López (2018) "The US Census Bureau keeps confusing race and ethnicity"
- Pew (2020) "What Census Calls Us: A Historical Timeline"
- White House (2023) "SOGI Best Practices"

September 13 – Wednesday: Data collection and sampling

Required readings:

- BW chapter 5

Optional readings:

- Bloomberg Quicktakes (2019) "The NBA Data Scientist" video (<https://www.youtube.com/watch?v=MpLHMKTolVw>)
- Wired (2022) "Statistician Answers Stats Questions From Twitter" video, just brief clip on biases in polls starting at 1:30 (<https://youtu.be/QW3KRaz4aI4?t=90>)

September 18 – Monday: Descriptive statistics

Assignment due:

- Problem Set 1

Required readings:

- BW chapters 6 and 7
- Donovan’s (2015) Congressional Research Service report “A Guide to Describing the Income Distribution,” just pages 1-2 and 7-16 (the rest is optional)

Optional readings:

- Huntington-Klein’s (2022) “Describing variables” video (<https://www.youtube.com/watch?v=XqiV1maDt44>)

September 20 – Wednesday: The normal distribution

- Required readings: Re-read pp 124-127 of BW chapter 7

September 25 – Monday: Contingency tables and Check-in Quiz 1

In-class:

- Check-in Quiz 1

Required readings:

- BW chapter 8
- Frederick et al. (2020) “Understanding the Deterrent Impact of US Overseas Forces” – only pages 47-48 (the start of Chapter 4) and pages 56-60 (Quantitative Findings and Analysis); the rest is optional

Optional readings:

- Isaacs et al. (2008) “Economic Mobility Project” – just Table 1: Mobility Outcomes for Men Whose Fathers Are at the Bottom and Top of the Earning Distribution (p 40); Table 3: Housing Ownership and Value by Income Group, 2004 (p 50); and the accompanying text for each table

September 27 – Wednesday: Go over Check-in Quiz 1, and Contingency tables

October 2 – Monday: Probability, part 1

Assignment due:

- Problem Set 2

Required readings:

- Spiegelhalter pages 205-213
- Diez et al. (2019) OpenIntro section 3.1

Optional readings:

- Chen et al (2016) “Decision Making Under the Gambler’s Fallacy”

October 4 – Wednesday: Probability, part 2

Required readings:

- Spiegelhalter pages 214-227
- Diez et al. (2019) OpenIntro section 3.2
- Meyerowitz-Katz (2021) “Why Are Vaccinated People Getting Covid-19?”

October 9 – Monday: Inference, confidence intervals, and the Central Limit Theorem

Assignment due:

- Problem Set 3

Required readings:

- BW pages 165-171
- Spiegelhalter pages 229-241

October 11 – Wednesday: Inference, confidence intervals, and the Central Limit Theorem, continued

Required readings:

- BW pages 171-176
- Spiegelhalter pages 242-247

Optional readings:

- Spiegelhalter pages 248-251

October 16 – Monday: No class (Fall study break)

October 18 – Wednesday: Midterm exam

October 23 – Monday: Go over midterm exam

Assignment due:

- Problem set 4

October 25 – Wednesday: Chi-square tests

Required readings:

- BW pages 177-190

Optional readings:

- BW pages 191-199

October 30 – Monday: T-tests, Differences in means

Required readings:

- BW pages 202-209

November 1 – Wednesday: T-tests, Pitfalls and subtleties and common mistakes

Assignment due:

- Problem set 5

Required readings:

- Dynarski et al. article (2021) “Closing the Gap”: just section IIA. “Randomization”, beginning on page 1729, and re-read Figure 4 on page 1736

November 6 – Monday: T-tests, Other variations

Required readings:

- BW pages 209-218

November 8 – Wednesday: Correlation, and Check-in Quiz 2

In-class:

- Check-in Quiz 2

November 13 – Monday: Go over Check-in Quiz 2, and correlation

Assignment due:

- Problem set 6

Required readings:

- BW chapter 14

November 15 – Wednesday: Simple regression

Required readings: TBD

Optional readings:

- Chen et al. (2016) “Decision Making Under the Gambler's Fallacy”, especially Table 2 on page 1200

November 20 – Monday: Interpretation wrap-up

Assignment due:

- Problem set 7

Required readings:

- Spiegelhalter chapter 14
- Bradley et al. (2021) on Big Data: “Unrepresentative big surveys significantly overestimated US vaccine uptake”
- Kessler (2018) on deaths in Hurricane Maria: “Did 4,645 people die in Hurricane Maria? Nope.”

Optional readings:

- Spiegelhalter chapters 12 and 13
- Milken Institute (2018) on excess mortality

November 22 – Wednesday: No class (Thanksgiving recess)

November 27 – Monday: Coding camp

November 29 – Wednesday: Coding camp

December 1 – Friday

- Assignment due: PS 8 due by 5 pm

December 4 – Monday: Coding camp

December 6 – Wednesday: Review

December 8 – Friday

- Assignment due: PS 9 due by 5 pm

December 13, 4-6 pm – Wednesday: Final Exam