Public Policy 529.001: Statistics – Standard Sequence
Fall 2022 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 12:30 – 1:30
- Fridays 1 – 2

Graduate student instructors (GSIs):
Kate Randall, kjrand@umich.edu
     Office location and office hours: TBD
Theo Kulczycki, theok@umich.edu
     Office location and office hours: TBD

Class meeting schedule: Mondays and Wednesdays, 2:30 - 3:50 pm in 1120 Weill Hall.
Section meetings: Fridays, 2:30 - 3:50 pm 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 though 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 26 and November 9. 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 19, and the final exam will be on Friday, December 16 (4 – 6 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.

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 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
If you believe you need an accommodation for a disability, please reach out to U-M Services for Students with Disabilities (SSD – https://ssd.umich.edu/) office to help determine appropriate academic

accommodations and how to communicate about your accommodations with your professors. Any information you provide will be treated as private and confidential.

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/oxbgig3kw5dwjzy/FINAL 2022 Masters Handbook.pdf). Additional information regarding academic dishonesty, plagiarism and misconduct and their consequences is available at: http://www.rackham.umich.edu/current-students/policies/academic-policies/section11#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 29 – Monday: Intro to the course

August 31 – 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 5 – Monday: No class (Labor day)

September 7 – 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 12 – 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"

September 14 – 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 19 – Monday: Descriptive statistics
Assignment due:
- Problem Set 1

Required readings:
- BW chapter 6
- 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 21 – Wednesday: The normal distribution
- Required readings: Re-read pp 124-127 of BW chapter 7

September 26 – 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 28 – Wednesday: Go over Check-in Quiz 1, and Contingency tables

October 3 – 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 5 – 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 10 – 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 12 – 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 17 – Monday: No class (Fall study break)

October 19 – Wednesday: Midterm exam

October 24 – Monday: Go over midterm exam
Assignment due:
- Problem set 4

October 26 – Wednesday: Chi-square tests
Required readings:
- BW pages 177-190
Optional readings:
- BW pages 191-199

October 31 – Monday: T-tests, Differences in means
Required readings:
- BW pages 202-209

November 2 – 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 7 – Monday: T-tests, Other variations
Required readings:
- BW pages 209-218

November 9 – Wednesday: Correlation, and Check-in Quiz 2
In-class:
- Check-in Quiz 2

November 14 – Monday: Go over Check-in Quiz 2, and correlation
Assignment due:
- Problem set 6

Required readings:
- BW chapter 14

November 16 – 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 21 – 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 23 – Wednesday: No class (Thanksgiving recess)

November 28 – Monday: Coding camp

November 30 – Wednesday: Coding camp

December 2 – Friday
- Assignment due: PS 8 due by 5 pm

December 5 – Monday: Coding camp

December 7 – Wednesday: Review

December 9 – Friday
- Assignment due: PS 9 due by 5 pm

December 16, 4-6 pm – Friday: Final Exam