University of Washington
Department of Economics
Econ 488 - Winter 2025
Jackson Bunting

1 Contact Information

My contact information is as follows:

- *Office:* Savery Hall 246

- *E-mail:* buntingj@uw.edu

- *Office hours:* Tu 11am-12pm in my office and online (washington.zoom.us/j/91677419604), or by appointment

2 Class time and place

- *Lectures:* Tu, Th 8:30-10:20 in Mueller Hall (MUE) 155

- *Course website:* https://canvas.uw.edu/courses/1800544

3 Course Description

This class will focus on causal inference in economics. That is, how economists seek to learn causal effects from observational data——going beyond documenting associations between variables (e.g., countries with less corruption are more prosperous) to isolate the effect of a variable of interest on an outcome (e.g., if a country became less corrupt, then it will be more prosperous).

My objective is that, by the end of this course, you are able to:

- Explain how economists think about causality in terms of counterfactual worlds and causal effects. Converse fluently in the language of causality in economics. This includes treatment, outcome and control variables, potential outcomes, treatment effects, and to be able to apply these general concepts to specific economic problems.

- Explain the conditions under which a regression line represents a causal effect instead of a simple correlation. To reason logically about whether the conditions are plausible or not in any specific economic setting.

- Develop an intuitive understanding of methods that economists use for causal inference, and to explain how the methods can isolate causal effects. These include matching, difference-in-difference, synthetic controls, instrumental variables, and regression discontinuity design.

- Differentiate between causal and statistical inference. Explain the importance of random sampling from a population. Explain what we can (and cannot) learn from a confidence interval, from machine learning.

3.1 References

- Main references: Lecture notes and Cunningham (2021)

- Additional references: Masten (2024), Masten (2025), Angrist and Pischke (2009), Angrist (2014), Imbens and Rubin (2015), and Stock and Watson (2020)

Many of these books are available digitally. Masten (2024) and Masten (2025) will be available on the course website.

3.2 A tentative list of topics

Textbooks referred to are Cunningham (2021) (C21), and Angrist and Pischke (2009) (AP09).

Topic	Reference
The Rubin Causal Model and RCTs	C21 Ch 4, AP09 Ch 2
Matching	C21 Ch 5, AP09 Ch 3
Difference in Differences	C21 Ch 9, AP09 Ch 5
Panel Data Methods	C21 Ch 8, AP09 Ch 5
Synthetic Controls	C21 Ch 10
IV-2SLS and LATE	C21 Ch 7, AP09 Ch 4
Regression Discontinuity	C21 Ch 6, AP09 Ch 6

4 Grading scheme

4.1 Exams

Both the midterm and final exam are written exams, held during the regular class time in the regular classroom. Both are closed-book, closed-notes, no calculators, no phones. The weights are as follows: the best of the two scores is given a weight of 40%(of the final grade), the worst of the two scores is given a weight of 30%. If a student does not take the midterm exam (e.g., because they are sick or have to travel out of the country on that day), the midterm exam's weight is 0% and the final's weight is 70%.

There is no make-up for the midterm exam. Requests for a make-up final exam must be accompanied by an email to the instructor and Cced to Ahna Kotila (akotila@uw.edu) that explains the grounds (e.g. health emergency) for the request and must be sent before the day of the exam.

4.2 Problem sets

There are 7 psets, they test and expand upon material covered during lectures. Pset #1 is to be submitted individually. Students are encouraged to submit group-work (2 or 3 students) for psets #2 through #7, one submission per group. Groups may change over time, though it may be more productive if they do not. Late submissions are not accepted, no matter the reason. Students who want their pset re-graded must make a request in writing within 1 week upon the return of your pset. Psets are graded based on a 0 to 100 scale. Psets will take quite a bit of your time and are rewarded accordingly: the total weight given to the psets is 30%. We understand that sometimes emergencies creep up and that a student may not be able to turn in a pset on its due date. For

this reason we drop a student's two lowest pset score (out of the 7 psets) when calculating the total score. Therefore, the best 5 psets each count for 6% each. If a student fails to submit a pset by the due date it automatically receives a 0 score out of 100. Typeset (see below) answers to psets provide from 0 to 2 points to be added to the course final score as a bonus. Type-setting points are assigned in proportion to how many psets are typeset out of 7 (e.g., if a student typesets 6 psets out of 7 they receive $2 \times 6 \div 7 = 1.714286$ bonus typesetting points). Thus, typesetting psets is rewarded but not required.

4.2.1 Typesetting

You are encouraged to typeset answers to psets as this leads to much more professionally looking work, pushes students to acquire valuable skills, and is standard expectation for jobs in data science. If you have previous experience with this (e.g., using LaTeX on overleaf, or with Jupyter Notebook), you may use your preferred typesetting tool. Otherwise I recommend combining code, output, and text using RMarkdown. I will provide a brief tutorial to RMarkdown and LaTeX during the first two weeks of classes.

4.3 Problem sets and exam schedule

Assessment	Date
Problem set 1	January 16
Problem set 2	January 23
Problem set 3	January 30
Problem set 4	February 6
Midterm	February 13
Problem set 5	February 20
Problem set 6	February 27
Problem set 7	March 6
Final Exam	March 13

4.4 Grading

Your course grade is based on your scores on the problem sets (32 points, including typesetting bonus), midterm and final exam (70 points, combined). Your score (out of 102) is converted to a letter/numerical grade as follows:

0.0 (E)	< 30
0.8 (D-)	$[30, 35)$
1.0 (D)	$[35, 40)$
1.3 (D+)	$[40, 45)$
1.7 (C-)	$[45, 50)$
2.0 (C)	$[50, 55)$
2.3 (C+)	$[55, 60)$
2.7 (B-)	$[60, 65)$
3.0 (B)	$[65, 70)$
3.3 (B+)	$[70, 80)$
3.7 (A-)	$[80, 90)$
4.0 (A)	$[90, 102]$

5   Statistical software

The problem sets will require the use of statistical software. In this class, we will use R. Students should have some familiarity with programming in R, e.g. from using it in at least one previous course. R is a language and environment for statistical computing and graphics. You can download and install R and RStudio (for free), for example by following the instructions here. The software should also be available on university computers. I will provide a refresher to programming in R early in the quarter. There are many helpful resources online, including:

- The recipes here.

- The swirl package is an interactive tool for learning R within R. A good start is the course "R Programming".

- A introduction/tutorial to R here from German Rodriguez.

- Stackoverflow!

Please write legible code! Some style advice is here: http://jef.works/R-style-guide

6   References

Angrist, J. (2014). *Mastering'metrics: The path from cause to effect.* Princeton University Press.

Angrist, J. D. and Pischke, J.-S. (2009). *Mostly harmless econometrics: An empiricist's companion.* Princeton university press.

Cunningham, S. (2021). *Causal inference: The mixtape.* Yale university press.

Imbens, G. W. and Rubin, D. B. (2015). *Causal inference in statistics, social, and biomedical sciences.* Cambridge university press.

Masten, M. (2024). *Causality for the Cautious.* Unpublished manuscript.

— (2025). *Statistical Inference in Econometrics.* Unpublished manuscript.

Stock, J. H. and Watson, M. W. (2020). *Introduction to econometrics.* Pearson.

7   University and departmental policies

7.1   Academic integrity

Departmental policy on academic integrity, including exam absences, is available here: https://econ.washington.edu/policy-academic-conduct. The University takes academic integrity very seriously. Behaving with integrity is part of our responsibility to our shared learning community. If you're uncertain about if something is academic misconduct, please ask me. Acts of academic misconduct may include but are not limited to:

- Cheating (working collaboratively on midterm/exam, sharing answers, and previewing midterm/exam)

- Plagiarism (representing the work of others as your own without giving appropriate credit to the original author(s))

- Unauthorized collaboration (working with each other on assignments beyond class policy)

Concerns about these or other behaviors prohibited by the Student Conduct Code may be referred for investigation. Students found to have engaged in academic misconduct may receive a zero on the assignment (or other possible outcomes).

7.2   Disability Resources

It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. If you have already established accommodations with Disability Resources for Students (DRS), please activate your accommodations via myDRS so we can discuss how they will be implemented in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), contact DRS directly to set up an Access Plan. DRS facilitates the interactive process that establishes reasonable accommodations. Contact DRS at disability.uw.edu.

7.3   Religious Accomodations

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/). Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/).

7.4   Safety

Call SafeCampus at 206-685-7233 anytime – no matter where you work or study – to anonymously discuss safety and well-being concerns for yourself or others. SafeCampus's team of caring pro-

fessionals will provide individualized support, while discussing short- and long-term solutions and connecting you with additional resources when requested.

The University of Washington prohibits sex discrimination and sex-based harassment and expects all UW community members to respect one another in our shared academic and work environments. Sex discrimination and sex-based harassment can include sexual assault, relationship violence, stalking, unwanted sexual contact, sexual exploitation, sexual harassment, and discrimination based on sex. Students who believe they have experienced sex discrimination or sex-based harassment are encouraged to contact a Title IX case manager by making a Title IX report. Additional resources are at this link: uw.edu/titleix/