

POL 503: Quantitative Methods for Social Science
University of Washington
Spring 2021

Class Meetings: Wednesdays 4:30-7:30PM

Office Hours: Wednesdays 3:30PM – 4:30PM in 131 Gowen

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Lab Instructor: Beatrice Magistro, magistro@uw.edu

Course Overview

This course continues the graduate sequence in quantitative methodology for the social sciences. The methods will primarily apply to political science, but are useful for research in other social sciences such as economics, sociology, and psychology. The focus of this class is to conceptually understand the use of regression models for statistical inference, properly apply these methods to analyze data using statistical software, draw valid conclusions, and present these conclusions in a concise and clear manner.

Quantitative social science is difficult. Unlike the ‘hard’ sciences, we rarely have the opportunity to run experiments in controlled lab settings. We will be methodologically *pluralist* in our pursuit of accurate answers to important research questions.

We will learn about *statistics* and *causal inference*. Mostly in lab, we will also learn about *computation*: how to summarize data from the real world. We will use the free programs *R* and *RStudio*. If possible, bring both a computer and a notepad to lecture and lab. Course assignments include problem sets, a take-home midterm, a take-home final, and a short data analysis project.

Social science methods are often best learned during the research process. In this course, we will not only learn concepts; we will learn *how* to learn methods on our own—how to ask about and Google for methods information.

Course Texts & Resources

You need two textbooks for this course:

- 1) Angrist, Joshua D., and Jörn-Steffen Pischke. *Mostly harmless econometrics: An empiricist's companion*. Princeton University Press, 2008 (hereafter *Mostly Harmless*).
- 2) Wickham, Hadley and Garrett Grolemund. 2017. *R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*. O'Reilly Media (hereafter *R4DS*). This book is also available at <https://r4ds.had.co.nz/>

We will also be occasionally reading empirical research papers, blog entries, and other online material.

Course Assignments & Requirements

Your grade is determined with the following weights:

- Problem sets, assigned most weeks and due in the next lecture (25% in total)
- 24-hour take-home midterm exam (20%)
- 24-hour take-home final exam (25%)
- Data Analysis Project (30%)

Important dates:

- April 15: Data Analysis Project proposal due
- April 29: Midterm exam available
- June 3: Final exam available
- June 10: Data Analysis Project due

In my experience, by far the strongest correlate of doing well in this course is to attend lecture and lab. Additional predictors include dedicating sufficient time to this course, and working collaboratively with classmates.

The UW's policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities, including more information about how to request an accommodation, is available [here](#). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form](#). Infants and small children are allowed in lecture in the case of childcare emergency.

You can collaborate with others on problem sets. Exams and the Data Analysis Project are to be done alone. The usual academic conduct standards apply as defined in UW Student Governance Policy, Chapter 209 Section 7.C.

Course Schedule

UNIT I: Regressions Beyond OLS

- Logit, probit
- Poisson, ordered logit, multinomial logit
- **Reading:**
 - *Mostly Harmless* Chapter 1
 - Brooks-Bartlett, Jonny. 2018. "Probability concepts explained: Maximum likelihood estimation." Available at: <https://towardsdatascience.com/probability-concepts-explained-maximum-likelihood-estimation-c7b4342fdbb1>

UNIT II: Bootstrapping Measures of Uncertainty

- **Reading:** Skim *Mostly Harmless* Chapter 8, but read closely starting on p226

UNIT III: Difference-in-Differences

- Sampling bias
 - Non-response
- Clusters, blocks, stratification
- Correlations
- **Reading:**
 - *Mostly Harmless* Chapter 5
 - Chapter 5 videos from Causal Inference Bootcamp. Available at: <https://mattmasten.github.io/bootcamp/>
 - Andrew Gelman and Guido Imbens. “Why ask why? Forward causal inference and reverse causal questions.” Available at: http://www.stat.columbia.edu/~gelman/research/unpublished/reversecausal_13oct05.pdf

UNIT IV: Matching

- Nearest neighbor matching, propensity score matching
- Coarsened exact matching
- Genetic matching
- **Reading:**
 - *Mostly Harmless* Chapter 3.3
 - Skim: Sekhon,asjeet. 2012. “Genetic Matching for Estimating Causal Effects.” *Review of Economics and Statistics*. Available at: <http://sekhon.berkeley.edu/papers/GenMatch.pdf>
 - Chapter 3.8 video from Causal Inference Bootcamp. Available at: <https://mattmasten.github.io/bootcamp/>

UNIT V: Instrumental Variables

- Noncompliance
- Exclusion restriction
- 2SLS estimation
- **Reading:**
 - *Mostly Harmless* Chapter 4
 - Chapter 4 videos from Causal Inference Bootcamp. Available at: <https://mattmasten.github.io/bootcamp/>

UNIT VI: Regression Discontinuity

- Sharp RDD
- Fuzzy RDD
- Bandwidths and specifications
- **Reading:**
 - *Mostly Harmless* Chapter 6

- Chapter 6 videos from Causal Inference Bootcamp. Available at: <https://mattmasten.github.io/bootcamp/>