POLS 7012: Introduction to Political Methodology

Fall 2022

Professor:	Joe Ornstein	**Time:**	W 4:00 – 6:45pm
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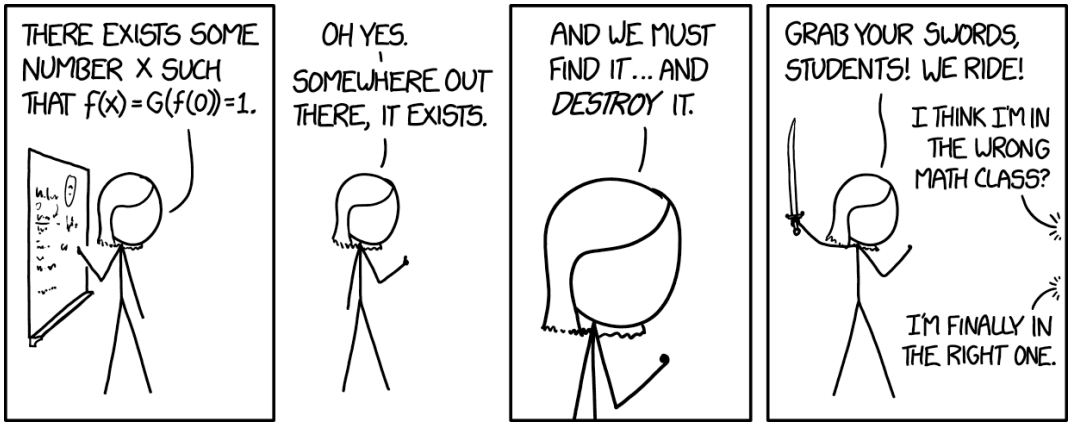
So you want to be a political scientist? Cool! It's a fun and fulfilling profession. But before you can eat your cake, you need to eat your vegetables. In this analogy, cake is political science, and vegetables is math. Because modern political science is heavily quantitative, and in order to fruitfully engage with the ongoing scientific conversation, you will need to understand the language.

I intend for this class to be a very practical introduction to the mathematical and computational skills you'll want to have as a professional political scientist. In Part 1 of the course (Discovery), you'll learn the programming skills you need to tidy up, explore, and describe patterns in data. In Part 2 (Uncertainty), you'll learn the foundational statistical tools you need to communicate uncertainty and generalize from samples to populations. In Part 3 (Causality), you'll learn how to design research that credibly identifies the causal relationships between variables. And when we're done, you'll have the fundamentals you need to tackle the advanced material that makes up the rest of the methods sequence.



Course Objectives

By the end of this course, you will be able to:

- Confidently work with data using the `R` programming language
- Create beautiful and informative data visualizations
- Organize your work so that it is transparent and reproducible
- Build basic statistical models and estimate their parameters from data
- Communicate the uncertainty around your estimates
- Design research that can credibly identify causation (not just correlation)

Assignments & Grading

Each week I will assign a problem set, due the Tuesday before class. Your responses will be graded for completion and reviewed in class. Feel free to work with your classmates, but please submit your answers individually. 70% of your grade will come from these problem sets, and 15% each from a midterm and final exam.

Office Hours and Email Policy

Office hours are by appointment. You can sign up for 15 minute slots here. My office is Baldwin 304C, but if you prefer we can video chat over the class Discord server. (I will send invite links for the Discord in the first week of class). If you send me an email, please allow me 24 hours to respond. Like many professors, my inbox is pretty overloaded. Also, I have small children, so it's my policy to not check email after 5pm or on weekends.

Recommended Books

I try to make my courses as cheap as possible, so all of the assigned readings for this class will be available free online (including a few of the textbooks listed below). However, if you're the sort of person that prefers reading hard copies, I recommend these books!

- Wickham, H., & Grolemund, G. (2016). *R For Data Science: import, tidy, transform, visualize, and model data.* O'Reilly Media, Inc.
- Moore, Will H., and David A. Siegel. 2013. A Mathematics Course for Political and Social Research. Princeton, NJ: Princeton University Pres.
- Wasserman, L. (2013). *All of Statistics: A Concise Course in Statistical Inference.* Springer Science & Business Media.
- Simon, C. P., & Blume, L. (1994). *Mathematics for Economists.* New York: Norton.
- Strogatz, Steven H. 2012. The Joy of X: A Guided Tour of Math, from One to Infinity. Boston: Houghton Mifflin Harcourt.
- Tufte, Edward (2001). *The Visual Display of Quantitative Information*
- Healy, Kieran (2018). *Data Visualization: A Practical Introduction.* Princeton University Press.

Tentative Course Outline

Moltke the Elder writes that no battle plan survives first contact with the enemy. This is doubly true for syllabi. We may need to be flexible, and deviate from the plan if some topics require more or less attention, or we think of something completely unexpected that we want to do, and it takes up a few weeks. Caveats aside, here is what I have planned!

PART 1: DISCOVERY

Week 1: Getting Started

Pre-Class Survey, Overcoming Fear, Setting Up R and RStudio, Zotero, Tidy Data, Basic Programming

Weeks 2-3: Visualizing Data

ggplot2, Distributions, Correlations, Conditional Distributions, RMarkdown

Week 4-6: Tidying, Transforming, and Describing Data

Importing, Merging, Tidying, Summary Statistics

Week 7: Midterm

Mini-conference

PART 2: BUILD MODELS

Week 8-9: Estimation

Limits, Derivatives, Optimization, Integration, Fundamental Theorem of Calculus, Regression

Week 10-11: Probability & Inference

Random Variables, Expectation, Variance, Conditional Probability, Bayes Rule, Law of Large Numbers, PDFs and CDFs, Central Limit Theorem, Hypothesis Testing

Week 12-14: Causality & Identification

Fundamental Problem of Causal Inference, DAGs, Confounding, Matrix Algebra, Multiple Regression

Week 15: Review & Catchup

Final Exam

Academic Honesty

Remember that when you joined the University of Georgia community, you agreed to abide by a code of conduct outlined in the academic honesty policy called *A Culture of Honesty*. Problem sets may be completed in groups, but I expect your responses to be individual, and the midterm and final must be completed individually.

Mental Health and Wellness Resources

- If you or someone you know needs assistance, you are encouraged to contact Student Care and Outreach in the Division of Student Affairs at 706-542-7774 or visit https://sco.uga.edu. They will help you navigate any difficult circumstances you may be facing by connecting you with the appropriate resources or services.
- UGA has several resources for a student seeking mental health services or crisis support.
- If you need help managing stress anxiety, relationships, etc., please visit BeWellUGA for a list of FREE workshops, classes, mentoring, and health coaching led by licensed clinicians and health educators in the University Health Center.
- Additional resources can be accessed through the UGA App.