

POLS 7012: INTRODUCTION TO POLITICAL METHODOLOGY

Fall 2023

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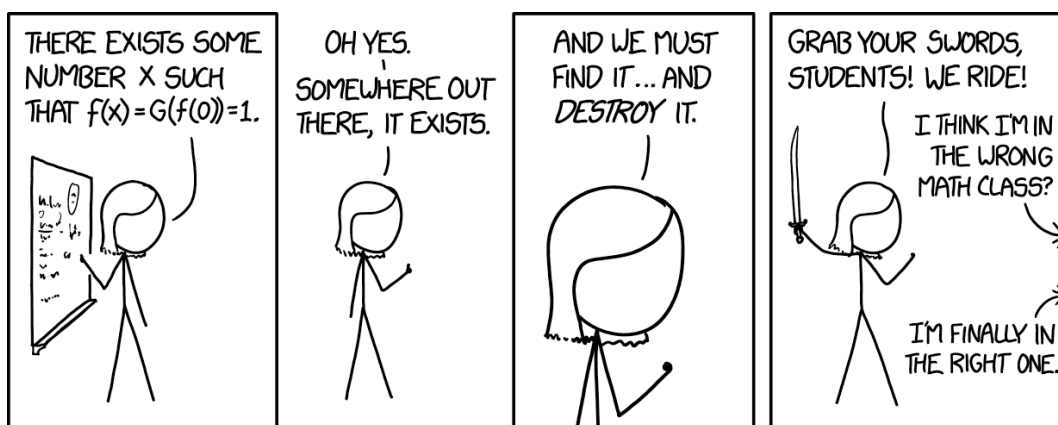
Website: <https://joeornstein.github.io/pols-7012/>

Time: W 3:55 – 6:40pm

Place: 302 Baldwin Hall

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, explore, and describe patterns in data. In Part 2 (Causality), you'll learn how to design research that convincingly distinguishes between correlation and causation. In Part 3 (Uncertainty), you'll learn the foundational statistical tools you need to communicate the uncertainty of your estimates and to generalize from samples to populations. 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
- Describe research designs 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

I will be available for meetings every Monday, Wednesday, and Friday afternoons, and you can sign up for 20 minute appointments [here](#). My office is Baldwin 304C, but if you prefer we can talk over Zoom. 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.

You should also feel free to seek assistance from the senior graduate students staffing the SPIA Methods Helpdesk. You can email them questions at spia-methods-help@uga.edu.

Recommended Books

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!

- Imai, Kosuke, and Nora Webb Williams (2022). *Quantitative Social Science: An Introduction in Tidyverse*. Princeton: Princeton University Press.
- Moore, Will H., and David A. Siegel. 2013. *A Mathematics Course for Political and Social Research*. Princeton, NJ: Princeton University Pres.
- Huntington-Klein, Nick. 2021. *The Effect: An Introduction to Research Design and Causality*. Chapman & Hall CRC.
- Tufte, Edward (2001). *The Visual Display of Quantitative Information*
- Healy, Kieran (2018). *Data Visualization: A Practical Introduction*. Princeton University Press.
- Wickham, H., & Grolemund, G. (2016). *R For Data Science: import, tidy, transform, visualize, and model data*. O'Reilly Media, Inc.
- 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.

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, Tidy Data, Basic Programming

Week 2: Summarizing Data

Computing Descriptive Statistics, Comparing Groups

Week 3: No Class (APSA)

Take time to explore your own datasets and develop ideas for midterm projects

Week 4: Visualizing Data

ggplot2, Distributions, Correlations, Conditional Distributions

Week 5: Tidying Data

Importing, Merging, Data Wrangling

Week 6: The Linear Model

Differential Calculus, Optimization, and Regression

Week 7: Midterm

Mini-conference

PART 2: CAUSALITY**Week 8: Causality & Identification**

Fundamental Problem of Causal Inference, DAGs, Confounding

Week 9: Closing the Back Doors

Matrix Algebra, Multiple Regression

Week 10: Sneaking Through the Front Door

Experiments, Instrumental Variables, Regression Discontinuity

PART 3: UNCERTAINTY**Week 11: Sampling**

Random Variables, Expectation, Variance, Conditional Probability, Bayes Rule, Central Limit Theorem, the Law of Large Numbers

Weeks 12-13: Statistical Inference and Hypothesis Testing

Integrals, Fundamental Theorem of Calculus, PDFs and CDFs, p-values, Confidence Intervals, t-tests

Weeks 14-15: Bonus Weeks

Review, Catchup, Bonus Topics, 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.