

POLS 7012: INTRODUCTION TO POLITICAL METHODOLOGY

Fall 2021

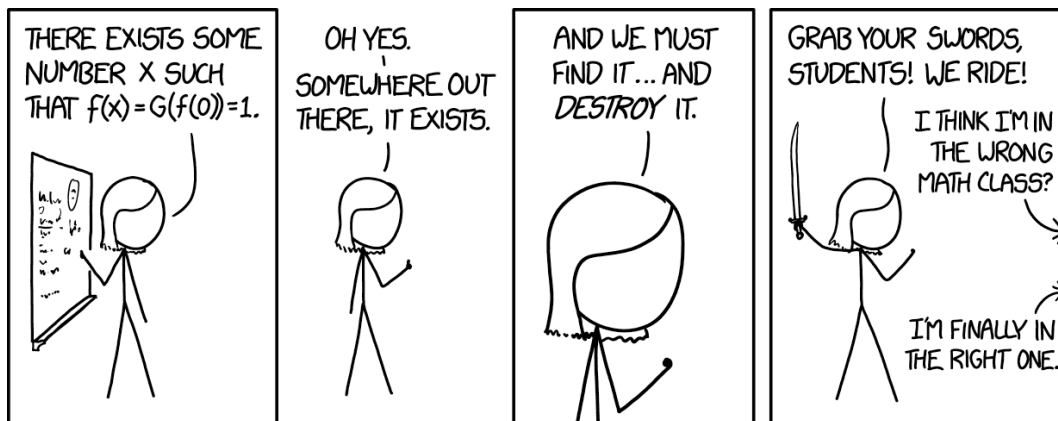
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Time: W 4:00 – 6:45pm

Place: 101D 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 the first half of the course, you'll learn the tools you need to explore, visualize, and tidy up datasets. In the second half, you'll learn how to build statistical models to help interpret the data you have. In essence, you'll learn how to tell the difference between patterns in data and random noise. 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. 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. The midterm and final exam will both be online and open-book.

Office Hours

I will be available for meetings every Wednesday from 2pm to 4pm, either in my office (delta variant permitting) or Zoom. You can sign up for 15 minute appointments [here](#).

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.
- 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.
- 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. The same is doubly true for course outlines. 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: LOOK AT YOUR DATA

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, Facets, RMarkdown

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

Importing, Merging, Tidying, Summarizing Distributions

PART 2: BUILD MODELS

Week 7-8: Estimation

Limits, Derivatives, Optimization, Integrals, Fundamental Theorem of Calculus

Week 7: Probability

Combinatorics, Random Variables, Expectation, Variance, Covariance, Conditional Probability, Bayes Rule, Law of Large Numbers

Week 8: Inference

PDFs and CDFs, Central Limit Theorem, Hypothesis Testing

Week 9: Review & Catchup

Midterm Exam

Week 10: Matrix Algebra and OLS

Regression, Systems of Linear Equations, Independence, Matrix Multiplication, Matrix Inversion

Week 11: Models and Prediction

Fitting Models, Machine Learning, Overfitting, Cross-Validation, Regularization, Ensembles

Week 12: Bonus Week 1

Possible Topics: *Causal Inference, Text-As-Data, Big Data, Machine Learning, Networks, Spatial Data, blogdown, bookdown, Advanced Reproducible Research*

Week 13: Bonus Week 2

Possible Topics: *Causal Inference, Text-As-Data, Big Data, Machine Learning, Networks, Spatial Data, blogdown, bookdown, Advanced Reproducible Research*

Week 14: Bonus Week 3

Possible Topics: *Causal Inference, Text-As-Data, Big Data, Machine Learning, Networks, Spatial Data, blogdown, bookdown, Advanced Reproducible Research*

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.