Welcome to Math Camp (2019)

Dept. of Political Science
University of Wisconsin–Madison

Instructors:
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August 19, 2019

Math and Political Science

(Political Science and Math)

Why math?

In general...

Math is explicit and specific

Formalizing: lay out premises and assumptions, derive implications

Discover hidden insights

Even if you don't do highly mathematical work, you will encounter it

For empirical research (data analysis...)

Principled measurement methods

Formally describe patterns in observed data

Make judgments about statistically meaningful findings (vs. random noise)

Make causal inferences

For formal models (game theory...)

Define sets of actors, preferences, incentives

Derive actors' strategies for optimal payoffs

Describe trade-offs of certain actions

Dealing with limited information, probabilistic beliefs, learning from new information

Objectives

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Operationally...

- Preparation for methods courses
- Practicing essential arithmetic routines

Conceptually...

- Show where political science needs math (using examples)
- Intuitive, conceptual understanding is most important

You won't memorize everything we cover this week,

but you need to be able to "roll with it" in class

Reassurances

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Some material will be unfamiliar (and maybe scary) at first, but...

- Nobody expects you to be an expert by the end of math camp (that isn't the point)
- The point is intuition and application, not proofs or overly tricky examples

How do we know you will be fine?

- Different areas of research emphasize different areas of math (and specialization is the norm)
- You get out what you put in

Questions so far?

Agenda

Mornings (9–12ish): math lessons

Lecture slides, definitions, examples

Afternoons (1–3ish): practice

Take-home exercises will be distributed

Instructors will be present to work through problems

Contact your instructors at any time

(But you should feel free to ask questions throughout)

Monday: Essential algebra and pre-calculus (Anton)

- Fundamentals, notation, functions

Tuesday: Linear algebra (Micah)

- Vectors and matrices
- Useful for manipulating real data

Wednesday: Calculus (Micah)

- Limits, derivatives, integrals
- How variables affect other variables

Thursday: Finish calculus, Probability (Micah/Anton)

- Mathematical intuitions of independent and conditional probability
- Probabilistic processes (random variables), patterns in "real data"

Friday: Finish probability (Anton)

Deliverables?

Daily exercises (not collected)

No final exam (or grades of any kind)

You are in charge of yourselves

Questions?

In the classroom

- Covering lots of ground
- Everyone has a different background
- Please ask questions
- Open and accepting environment

Let us (Micah and me) know how we can make this work better

- Ask lots of questions! They help the entire class!
- Slow us down
- Ask why we are learning something

Resources

The Github repository:

- Slides, exercises
- Source code to build it all

Other resources:

- View last year's materials
- Gill, Essential Mathematics for Political and Social Research
- Moore & Siegal: A Mathematics Course for Political & Social Research

About your instructors

Micah Dillard

A proud Ohio son (Columbus)

Studies international relations & political methodology (since 2014)

Domestic politics, economic sanctions, and foreign policy

Methological focus: Formal theory (algebra and calculus)

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Anton Shirikov

Originally from Russia. Switched back and forth between journalism and academia, but finally settled on the latter

Studies comparative politics & political methodology (since 2015)

Authoritarian politics, media, propaganda, legacies of communism

Methodological focus: text analysis, experiments

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Acknowledgements

We thank Sarah Bouchat, Michael DeCrescenzo, Brad Jones, and Dave Ohls for sharing previous Math Camps' materials.

Let's get started