

# Welcome to Math Camp (2019)

Dept. of Political Science  
University of Wisconsin–Madison

Instructors:  
Micah Dillard and Anton Shirikov

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# 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

Methodological focus: Formal theory (algebra and calculus)

Email: [micah.dillard@wisc.edu](mailto:micah.dillard@wisc.edu)

# 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

Email: [shirikov@wisc.edu](mailto:shirikov@wisc.edu)

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Let's get started