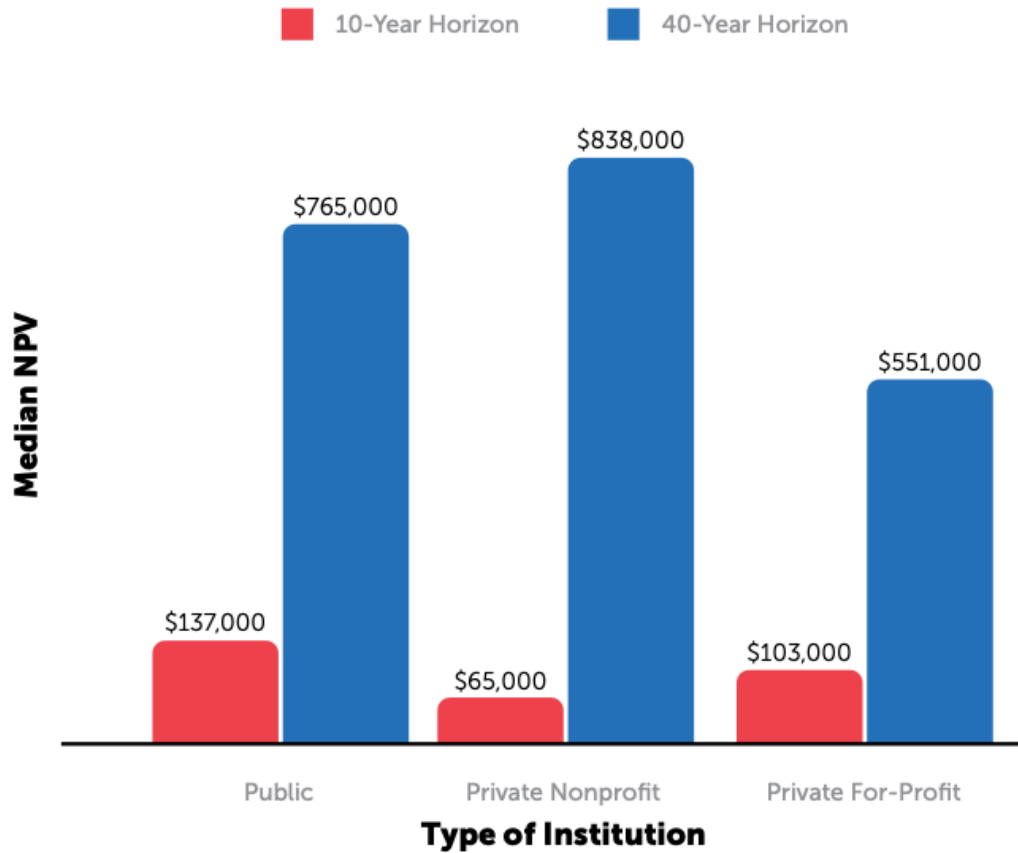


# **POLI SCI 210**

Introduction to Empirical Methods in Political Science

Winter 2025

Figure 3. In the long term, the net present value of future earnings for students who attend private nonprofit colleges is greater than that of earnings for students who attend public institutions.



Source: Georgetown University Center on Education and the Workforce, 2019

# About this course

- **Empirical:** Derived from observation, positivist
- **Methods:** Tools for research (mostly quantitative)
- **Political:** Who has power, how power is used
- **Science:** Knowledge generation through *falsification*

**Complement:** POLI\_SCI 211 – Interpretive Methods

**Follow with:** POLI\_SCI 312 – Statistical Research Methods

# Plan for today

- Who are we and why are we here?
- How this course works

**Wednesday:** The scientific method

NO SECTIONS THIS WEEK

**Who are we and why are  
we here?**

# Instructor

 Gustavo Diaz (he/him/his)

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 Scott Hall 103

 Thursdays 2:00 – 4:00pm or [by appointment](#)

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Check the syllabus for discussion sections and TA office hours

# About you

- Polisci majors?
- Filling a requirement?
- Here for the vibes?
- In the waitlist?



# About you

- Polisci majors?
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Registration questions or problems? Contact Undergraduate Program Coordinator:  
[briana.martinez@northwestern.edu](mailto:briana.martinez@northwestern.edu)

# Course overview

# Textbook

## Empirical Methods in Political Science: An Introduction

*Jean Clipperton, et al.*

2022-10-06

### Preface

Edits or suggestions for this text can be emailed to  
[digitalpublishing@northwestern.edu](mailto:digitalpublishing@northwestern.edu).



<https://nulib-oer.github.io/empirical-methods-polisci/>

# Canvas

- Syllabus
- Course materials by week
- Updated regularly with readings, slides, etc.
- Complete/submit assignments
- Check grading

[canvas.northwestern.edu/courses/224184](https://canvas.northwestern.edu/courses/224184)

# Assignments

1. **Quizzes** (10 points each, weekly)
2. **Research design critiques** (10 points each, weekly)
3. **AI memos** (10 points each, weekly)
4. **Section participation** (10 points each, weekly)
5. **Research proposal** (30 points, optional)

350 points total, need 200 for an A

25 points/week gives you two weeks to spare

**Valentine's rule:** Get *at least* 100 points by February 14 or get 20 points deducted 💔

# AI memo example

m365.cloud.microsoft

# A typical week

- **Before Tuesday:** Check Canvas for updated materials (1-2 chapters + 1 article)
- **Tuesday:** Quizzes and AI memo prompts available at beginning of lecture
- **Wednesday:** Prepare for discussion sections
- **Thursday:** Lecture, discussion sections, instructor open office hours
- **Friday:** Discussion sections, weekly assignments due at 11:59 PM

# **The Scientific Method**

**POLI SCI 210**

Introduction to Empirical Methods in Political Science



# Lingering questions

- About syllabus?
- Canvas?
- Assignments?
- Grading?
- Readings?
- Office hours?
- Anything?

# Last time

This is a course about **Political Science** research methods

1. **Politics:** Power relationships across many subfields
2. **Science:** Knowledge generation through falsification

# Informally

Some philosophers may think “Political Science” is an *oxymoron*

1. **Politics:** Normative statements about what’s good for the *polity*
2. **Science:** True, unquestionable knowledge

Can there be a **SCIENCE** of **POLITICS**?

# Whiteboard



## POLI SCI 210 - What is Science?

[See the board](#)



POLI SCI 210 - What is Science? [↗](#)

Modified 19 hours ago





# The goal of science

- **Inference:** Use *what we know* to learn about *what we do not know*
- **Key:** Try to prove ourselves wrong, even if we believe we are right (*falsification*)
- Scientific statements are **falsifiable**

# Scientific statement

A meaningful

Definition from Clark, Golder, and Golder (2024). “Principles of Comparative Politics.” CQ Press. Chapter 2.



# Scientific statement

A meaningful declarative sentence

Definition from Clark, Golder, and Golder (2024). “Principles of Comparative Politics.” CQ Press. Chapter 2.

# Scientific statement

A meaningful declarative sentence that is **unambiguously true or false**.

- **Meaningful:** We agree on its interpretation
- **Declarative:** Claims or asserts something
- **Unambiguously true or false:** One or the other, but not both or neither (therefore refutable or falsifiable)

Definition from Clark, Golder, and Golder (2024). “Principles of Comparative Politics.” CQ Press. Chapter 2.

# Unscientific statements

- Triangles have three sides
- Political science is the study of politics
- God created the world
- Edison created the lightbulb

# Unscientific statements

Two types:

1. Tautologies
2. Unobservable phenomena

**Important:** non-science  $\neq$  nonsense

# Reminder

Scientific statements are true or false

Scientific knowledge/evidence is neither

Why?

How do you **evaluate** a scientific statement?

# The scientific method

**Step 0:** Puzzle/Question

**Step 1:** Theory/Model

**Step 2:** Hypothesis/Implications

**Step 3:** Observation/Testing

**Step 4:** Conclusion/Evaluation

More details next week!

# Example

## Study by Tulane researcher suggests marijuana can cause infertility in men

| Lance Sumler [lsumler@tulane.edu](mailto:lsumler@tulane.edu)

[View PDF](#)



[medicine.tulane.edu/news/study-tulane-researcher-suggests-marijuana-can-cause-infertility-men](https://medicine.tulane.edu/news/study-tulane-researcher-suggests-marijuana-can-cause-infertility-men)

# Practice

Puzzle/question:



# Practice

**Puzzle/question:** Does marijuana cause infertility?

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:**

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

**Hypothesis:**

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

**Hypothesis:** Male smokers have lower semen volume than non-smokers

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

**Hypothesis:** Male smokers have lower semen volume than non-smokers

**Test:**

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

**Hypothesis:** Male smokers have lower semen volume than non-smokers

**Test:**

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

**Hypothesis:** Male smokers have lower semen volume than non-smokers

**Test:** Bring men to lab, ask if they smoke, measure sperm, ask if they smoke, compare



# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

**Hypothesis:** Male smokers have lower semen volume than non-smokers

**Test:** Bring men to lab, ask if they smoke, measure sperm, ask if they smoke, compare

**Conclusion:**

# Practice

**Puzzle/question:** Does marijuana cause infertility?

**Theory:** THC kills cells

**Hypothesis:** Male smokers have lower semen volume than non-smokers

**Test:** Bring men to lab, ask if they smoke, measure sperm, ask if they smoke, compare

**Conclusion:** “Study by Tulane researcher **SUGGESTS** marijuana **CAN** cause infertility in men”

# Why the cautious language?

We want to know the **counterfactual**: Person A's fertility with and without marijuana *consumption*

But we can only compare **smokers** to **non-smokers**

This is the **fundamental problem of causal inference** (more in week 5)

# Why the cautious language?

Also...

- Only men
- Undergoing fertility evaluation
- In *one* urology clinic in Washington state
- 409 total, 71 current smokers (17%), 103 past smokers (25%)

# Testing theories

- Cannot test **theories** because they are **statements**
- Need to **believe** theory is true to engage with it scientifically
- Instead, test **arguments** that follow from a theory (hypotheses, implications)

**Valid argument:** Accepting it *compels us* to accept conclusion

**Invalid argument:** Accepting premises *frees us* from accepting/rejecting conclusion

# Scientific critiques

Valid critiques to valid arguments fall in *three categories*

1. **Omitted variable:** Stress leads men to smoke marijuana AND to become infertile
2. **Reverse causation:** Infertility causes men to smoke marijuana
3. **Selection bias:** Men who smoke marijuana wait longer before going consulting a doctor

# Scientific critiques

A valid critique implies:

1. Observed implications also follow from **alternative theories**
2. **Cannot falsify** theory
3. Need to find **better implications** to distinguish among competing theories

# Scientific critiques

## Scientist's dilemma:

- When evidence supports hypothesis, your theory is ~~accepted~~  
**not rejected**
- When evidence *does not* support hypothesis, your theory is  
~~rejected~~ **not accepted**
- No such thing as *definitive* knowledge
- Future research can always flip things around!



# Takeaways

1. Science differs from other forms of knowledge generation in that we try really hard to prove ourselves wrong
2. Scientific statements/arguments are falsifiable
3. We never observe the ideal counterfactual
4. We can only test a few implications of a theory at a time
5. Findings can align with many alternative theories

# Next week: Theory and data

## EMPS Chapters 3-4

- What is a theory? What is a good theory?
- Different types of data/variables

## Application: Billionaire politicians

- Think about the decisions that were made to define and measure this category