Introduction to Political Research
Government 310

Ryan T. Moore*

25 August 2023 at 08:07

Course Information

Government GOVT 310
Introduction to Political Research
Section 001: Monday and Thursday, 9:45–11:00am Eastern
Location: Kerwin Hall 101

Instructor Information

Ryan T. Moore, Ph.D.
Associate Professor of Government
Office: Kerwin Hall 228
Telephone: +1 202 885 6470
Homepage: http://www.ryantmoore.org
Email: rtm (at) american (dot) edu
Office Hours: Monday and Thursday 11:00-12:00, or by appointment
(Please use https://calendly.com/ryantmoore to schedule times.)

Teaching Assistant Information

Ali Amini
Ph.D. Student, Department of Government
Email: aa6718a@american.edu
Office Hours: Wednesday 9:00pm-10:00pm and by appointment
Location: Café on ground floor, Kerwin Hall

Young Oh
Ph.D. Student, Department of Government
Email: ko4106a@american.edu
Office Hours: Friday 10:30am-11:30am and by appointment
Location: Café on ground floor, Kerwin Hall

*Department of Government, American University, Kerwin Hall 228, 4400 Massachusetts Avenue NW, Washington DC 20016-8130. tel: 202.885.6470; rtm (at) american (dot) edu; http://www.ryantmoore.org.

Course Description

This course is an introduction to modern quantitative political research. We will discuss the nature of quantitative research, how to design research to answer different types of political questions, how to analyze quantitative data, how to implement analysis using the R statistical language, and how to interpret the results of analysis. Specific topics will include causal inference, descriptive statistics, visualization, linear regression models, and statistical testing and inference.

Learning Objectives

This course serves as the introduction to political science research, including the logic of inference, research design, and the basics of quantitative analysis. Students will, thus, learn and apply skills essential to social science research, as a preparation for graduate school or professional work in the field. The assignments are designed to help students understand how political scientists generate knowledge about political phenomena.

Students who successfully complete this course will be able to:

1. Define an original research project dealing with a political problem, using an appropriate methodology
2. Produce a literature review on the subject that summarizes and analyzes the state of knowledge in political science on a research question
3. Perform tests appropriate to different types of data
4. Analyze and interpret the results of the tests
5. Produce a well-written and thorough final research paper that includes a statement of the research question, literature review, study design, and analysis and conclusions
6. Present their research orally to the class and political science faculty

This course satisfies the learning outcomes required of AU Core Quantitative Literacy II (Q2). Students who successfully complete this course will be able to:

1. Translate real-world questions or intellectual inquiries into quantitative frameworks
2. Select and apply appropriate quantitative methods or reasoning
3. Draw appropriate insights from the application of a quantitative framework
4. Explain quantitative reasoning and insights using appropriate forms of representation so that others could replicate the findings

You will be able to

- Differentiate causal from descriptive statistical analyses
- Test substantive hypotheses using quantitative methods
- Conduct original data analysis that uses a technique from the course to answer a relevant political science question
- Use R to import and manipulate data, perform analyses, and produce publication-quality graphics

Learning Strategies

Readings

Readings should be completed before the course meeting under which they are listed below. The course readings are primarily from my own notes and the textbook. The textbook engages with some of the most recent, most interesting research in political science and cognate social sciences. My notes provide summaries, exercises, and additional examples; they will structure our class discussion. When you read about a study or method that's interesting to you, find the original paper and read it, too. We will occasionally have short quizzes over the reading.

The primary textbook for the course is

> Imai, Kosuke and Nora Webb Williams. *Quantitative Social Science: An Introduction in tidyverse*. Princeton University Press, Princeton, NJ, 2022.

The supplementary Web site with data sets, e.g., is `https://github.com/kosukeimai/qss`. This page also describes packages like `qss`, `qss.student`, `qss-swirl`, and `qss-tidy` that may be helpful.

Computers and Notes in Class

For most class meetings, we will focus our attention on statistical concepts. We will also discuss implementation of methods in R, but this will be a secondary focus of class meetings. There will occasionally be time in class to pose your specific questions about R coding, however. I expect to spend most of our time on handouts that we intend for you to write on directly. We will distribute these through Canvas as PDFs; plan to print or download them to write on digitally. Although the experiments are relatively small, longhand writing appears to be a superior strategy for taking notes under some conditions. See http://j.mp/2uJAp6z for a summary brief. At least, there is no evidence that note-taking via laptop is beneficial in

> Mueller, Pam A. and Daniel M. Oppenheimer. The Pen is Mightier than the Keyboard: Advantages of Longhand Over Laptop Note Taking. *Psychological Science*, 25(6):1159–1168, 2014.

In lab sessions, our time will be devoted to conducting applied data analysis with a computer. See below for more detail.

Requirements and Evaluation

Students are required to do the weekly reading, attend class, complete all assignments, and contribute significantly to course discussions about the material.

The student's final course assessment includes several components: problem sets (weighted 25%), labs (10%), reading quizzes (10%), a midterm exam (15%), a final paper, a roughly 5-minute oral presentation and defense of that paper, and the paper's replication code (30%), and engagement in course conversations through attendance, in-class participation, and Slack participation (10%).

A summary of the course assessments is in Table 1.

If you cannot submit an assignment on time, arrange to submit it early. We encourage you to use office hours to discuss any specific assignments, difficulties, or questions about the course.

Academic integrity is a core value of institutions of higher learning. It is your responsibility to avoid and report plagiarism, cheating, and dishonesty. Please (re-)read the University policy on

Assignment	Weight	Due date
Problem Sets (4)	25%	Sep 21, Oct 19, Nov 16, Nov 30
Labs (2)	10%	Oct 2, Dec 4
Reading quizzes (14)	10%	(days without others due)
Midterm Exam	15%	Nov 9
Final presentation	5%	Nov 19/20/27
Final paper and code	25%	Dec 14
Participation (Attendance, Slack, quizzes, paper memo)	10%	(throughout)
Memo		Oct 26

Table 1: Course Assessment Summary

academic integrity at http://www.american.edu/academics/integrity/code.cfm, particularly Sections I and II.

Problem Sets

The four problem sets should be completed outside of class. You should submit a printed out hard copy of your solution set before the start of the class in which the problem set is due. You may also submit your solutions to the course Canvas site. We recommend this additional step as a way to create a backup of your final submission that is time-stamped and visible to the instructors.

You may work with others on the problem sets, but every keystroke of your submission must be your own. You may not copy code or answers from others, but you may develop your code with classmates. This includes all support from resources outside of class (StackOverflow, ChatGPT, etc.). You are responsible for understanding and being able to explain every line of code you submit.

Labs

The lab will take place during class time. During these class meetings, you will work with a randomly-selected partner on a data analysis task. The task will reflect methods we've studied in class, but will require applying them to new data. The instructors will be available to answer questions, but you and your teammate will be responsible for performing, documenting, and submitting your analysis during class time. You will submit your lab to the designated folder on the course Canvas page.

Reading Quizzes

Reading quizzes will take five minutes at the beginning of class, will have roughly five questions, and will be scored 0-5. The student's best 10 reading quiz scores will be counted, and there are no make-up opportunities. Each counted reading quiz counts 1% toward the final mark. You will receive 0.5% simply for completing the quiz in good faith at the appropriate time. The other 0.5% will reflect your score. E.g., if you score 4/5 on a reading quiz, you will earn

$$\underbrace{0.5\%}_{\text{Completion}} + \underbrace{\frac{4}{5} \cdot 0.5\%}_{\text{Score}} = 0.9\%$$

toward the final mark.

Why are there so many reading quizzes? Each one represents a graded, but low-stakes, opportunity to evaluate your understanding of core concepts and techniques. These intend to encourage regular engagement with the course material throughout the semester. Only your ten best quiz scores count.

Midterm Exam

The midterm exam will take place during class time. Expect about 25 multiple choice questions.

Final Project

For the final project, you will engage in original political science research. You will define your own research question, with attention to the intellectual or policy contribution that you will make by answering it.

You will select data sets, pose an appropriate political research question that the data can answer with quantitative methods, analyze the data, write a paper, and present your research. The paper must provide appropriate political, social, and intellectual context for the question you pose. Projects that connect otherwise disconnected data sets often emerge as the most innovative social science work). We will begin our detailed discussion of the project around midsemester, but you should start thinking about your project soon.

Your project should represent original data analysis, and should address a question of interest to policymakers or the research community. It should represent quantitative social science at the highest level you can muster.

One option is to use data that policymakers want to learn about. In conjunction with The Lab @ DC, a research arm of the Executive Office of the Mayor, we will provide you with a handful of data sets pertaining to policies and programs of Washington, DC. Topics will include campaign finance and expenditures, ANC budgets, public goods and the 311 request system, transit, and affordable housing. If you have an inclination to work on another topic, speak with the instructor early in the semester. We recommend starting with the data available at http://opendata.dc.gov.

`swirl` Exercises

Modern applied social science requires using a computer to analyze data. We will do so using R, which is free, open-source, powerful, and in high demand by employers. The best way to learn R is to try it. `swirl` is an R package that is designed to teach you R. Completing the `swirl` exercises can help you learn the techniques of the course. These exercises are not submitted to the instructors.

Software, Statistics, Data, and Literature Support

The primary statistical software for the course is R. See http://j.mp/2e8zBkC for help getting started. Support for statistical software is available through CTRL. See https://bit.ly/3ABF1w4 for tutorials and https://bit.ly/3ADGIsV for CTRL's calendar.

The Department of Mathematics and Statistics offers statistical consulting services, with extensive hours. For the schedule and contact information, see http://j.mp/1EmVqkY.

The library itself offers support for various software. Our librarian is Olivia Ivey, whom I recommend reaching out to as you formulate a question, search for data, and try to put your

question in a larger intellectual or policy context. You can book an appointment with Olivia at https://aulib.info/oivey.

The Peer-Assisted Student Support Program offers free, online tutoring in GOVT-310; see https://american.mywconline.net/.

Intellectual Property

Course content is the intellectual property of the instructor or student who created it, and may not be recorded or distributed without consent.

Students are not permitted to make visual or audio recordings, including live streaming, of classroom lectures or any class related content, using any type of recording devices (e.g., smart phone, computer, digital recorder, etc.) unless prior permission from the instructor is obtained, and there are no objections from any of the students in the class.

Course Evaluation

The course evaluation will take place online towards the end of the semester. Please take time to provide this important feedback.

Replication Policy

Students must retain copies of all `.R` and `.Rmd` files that include their data processing and analysis for problem sets, labs, and the final project. In keeping with standard practice in the discipline, these files should be able to be run by others, and should reproduce all results the student submits. Students must submit a replication code file with the final project.

Further Information for American University Students

For further detailed information on the important issues of academic integrity, emergency preparedness, academic support, discrimination, and use of social media, please see here.

Calendar

28 August

Introduction to quantitative social science.

- ☐ Required reading: This syllabus.

31 August

Introduction to statistical computing environments.

- ☐ Required reading: Imai, Chapter 1
- ☐ Optional exercises in R: `swirl() INTRO1`

1 September

Optional Drop-in Session.
Installing R, RStudio, and `tinytex`. `swirl` exercises.

13:00 - 15:00, in the Kerwin Café

4 September

No class meeting. (Labor Day holiday.)

7 September

Causal Inference I.
Reading quiz.

- ☐ Complete the First Two Weeks Checklist
- ☐ Required reading: Imai §2.1-2.3, especially §2.3
- ☐ Required reading: Notes `01-causal`
- ☐ Optional exercises: `swirl() INTRO2`

11 September

Randomized experiments and observational studies.
Reading quiz.

- ☐ Required reading: Notes `02-rand-obs`
- ☐ Required reading: Imai §2.4-2.5
- ☐ Optional exercises: `swirl() CAUSALITY1`

14 September

Descriptive statistics.
Reading quiz.

- ☐ Required reading: Notes `03-descriptives`
- ☐ Required reading: Imai §2.6-2.7
- ☐ Optional exercises: `swirl() CAUSALITY2`

18 September

Visualization.
Reading quiz.

- ☐ Required reading: Notes `04-visualization`
- ☐ Required reading: Imai §3.1-3.4
- ☐ Optional exercises: `swirl() MEASUREMENT1`

21 September

Bivariate statistics. Survey sampling.

- ☐ Required Problem Set 1 due
- ☐ Required reading: Imai §3.5-3.7
- ☐ Required reading: Notes `05-cor_z`

25 September

Clustering via k-means.
Reading quiz.

- ☐ Required reading: Imai §3.8-3.9
- ☐ Optional exercises: `swirl() MEASUREMENT2`

28 September

Prediction and classification.
Reading quiz.

- ☐ Required reading: Imai §4.1
- ☐ Required reading: Notes `07-prediction`
- ☐ Optional exercises: `swirl() PREDICTION1`

2 October

Lab I

5 October

Linear regression I.
Reading quiz.

- ☐ Required reading: Imai §4.2
- ☐ Required reading: Notes `08-linear`
- ☐ Optional exercises: `swirl() PREDICTION2`

9 October

Linear regression II.
Reading quiz.

- ☐ Required reading: Notes `09-linear2`
- ☐ Required reading: Imai §4.3

12 October

Regression + Causal Inference.
Reading quiz.

- ☐ Required reading: Notes `10-linear_exps_RDD`
- ☐ Required reading: Imai §4.4-4.5

16 October

Regression review. Reading quiz.

- ☐ Final project check-in
- ☐ Optional exercises: `swirl() PREDICTION3`

19 October

Probability I.

- ☐ Required Problem Set 2 due
- ☐ Required reading: Notes `11-prob_conditional`
- ☐ Required reading: Imai §6.1-6.2.2

23 October

Probability II.
Reading quiz.

- ☐ Required reading: Notes `12-prob_cond_bayes`
- ☐ Required reading: Imai §6.2.3-6.2.4

26 October

Probability III.

- ☐ Final paper memo due
- ☐ Required reading: Notes `13-rv_dists`
- ☐ Required reading: Imai §6.3
- ☐ Optional exercises: `swirl() PROBABILITY1`

30 October

Probability IV: Random variables and distributions (LLN and CLT)
Reading quiz.

- ☐ Required reading: Imai §6.4-6.5
- ☐ Optional exercises: `swirl() PROBABILITY2`

2 November

Uncertainty I: Standard errors and confidence intervals.
Reading quiz.

- ☐ Required reading: Imai §7.1.1-7.1.4
- ☐ Required reading: Notes `14-uncert_ci_t`
- ☐ Optional exercises: `swirl() UNCERTAINTY1`

6 November

Uncertainty II: Analyzing experiments and the t-test.
Reading quiz.

- ☐ Required reading: Imai §7.1.5-7.1.6

9 November

Midterm exam.

13 November

Uncertainty III: Hypothesis testing.
Reading quiz.

- ☐ Required reading: Notes `15-uncert_nhst`
- ☐ Required reading: Imai §7.2.1-7.2.4 (especially §7.2.3 and §7.2.4)
- ☐ Optional exercises: `swirl() UNCERTAINTY2`

16 November

Uncertainty IV: Hypothesis testing.

- ☐ Required Problem Set 3 due
- ☐ Required reading: Imai §7.2.5-7.2.6

20 November

Presentations I.
This session will meet virtually on Zoom.
You are *required* to attend and present at either this session or 27 November.
You are welcome at both!

- ☐ Final PDF of slides due to Canvas by 20:00 (8pm) on Sunday, 2023-11-19.
- ☐ Slides are due at the same time for all students, regardless of presentation date.

27 November

Presentations II.

30 November

Uncertainty V: Inference about linear regression.

- ☐ Required Problem Set 4 due
- ☐ Required reading: Notes `16-uncert_linreg`
- ☐ Required reading: Imai §7.3-7.4
- ☐ Optional exercises: `swirl() UNCERTAINTY3`

4 December

Lab 2.

7 December

Uncertainty and Testing Review.
Building regression models.
Reading quiz.

14 December

Final exam scheduled, 8:10-10:40am.
No class meeting.

- ☐ Final paper due to Canvas by 10:40 on Thursday, 2023-12-14.