Introduction to Political Research
Government 310

Ryan T. Moore*

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Course Information

Government GOVT 310
Introduction to Political Research
Section 007: Monday and Thursday, 9.45–11.00am EDT
Location: Zoom Meeting

Instructor Information

Ryan T. Moore, Ph.D.
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Office Hours: Wednesday 1:00pm-3:0pm, or by appointment
(Please use https://calendly.com/ryantmoore to schedule times.)

Teaching Assistant Information

Mason Buonadonna
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Office Hours: Tuesday 12:00pm-2:00pm EDT and by appointment
Location: Virtual Office Hours

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,

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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 satisfies AU Core Q2 requirements. Thus, by the end of the course, you will be able to

- Translate political phenomena into quantitative frameworks
- Select and apply appropriate quantitative methods and reasoning
- Differentiate causal from descriptive statistical analyses
- Draw appropriate insights from the application of a quantitative framework
- Understand the value and limitations of specific quantitative methods
- Test substantive hypotheses using quantitative methods
- Explain quantitative reasoning and insights using appropriate forms of representation so that others could replicate the findings
- 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. *Quantitative Social Science: An Introduction*. Princeton University Press, Princeton, NJ, 2017.

The supplementary Web site with data sets, e.g., is https://github.com/kosukeimai/qss.

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 20%), labs (20%), reading quizzes (10%), a midterm exam (10%), a final paper and a roughly 10-minute oral presentation and defense of that paper (30%), and engagement in course conversations through attendance, in-class participation, and Slack participation (10%). Problem sets, labs, and the final paper and presentation will be scored 0-10.

A summary of the course assessments is in Table 1.

Assignment	Weight	Due date
Problem Sets (4)	20%	Sep 14, Oct 8, Nov 12, Nov 23
Labs (2)	20%	Sep 24, Oct 19
Reading quizzes (14)	10%	(days without others due)
Midterm Exam	10%	Oct 29
Final paper and defense	30%	Dec 3
Participation	10%	(throughout)
(Attendance, Slack, quizzes, paper memo, `swirl` exercises)		
Quiz		Sep 10
Memo		Oct 22

Table 1: Course Assessment Summary

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 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 PDF of your solution set to Canvas before the start of the class in which the problem set is due. 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. You are responsible for understanding and being able to explain every line of code you submit.

Labs

The two labs 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.

Midterm Exam

The midterm exam will take place during class time and will be distributed as a PDF. Expect about 20 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.

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.

You will select data sets, pose an appropriate political research question that the data can answer with quantitative methods, analyze the data, write a short data analysis report, and present

your research.The report must provide appropriate political, social, and intellectual context for the question you pose. You are welcome to augment the data provided with any other appropriate data you need (this is optional, but this sort of bridging often defines the most innovative social science work). We will begin our detailed discussion of the data around midsemester, but you should start thinking about your project and partner 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. You should work with one other student on the final project. Working collaboratively is typical in political science research.

Participation: `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 will help you learn the techniques of the course, and will be needed to participate in class discussions and answer quiz questions. 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 http://j.mp/ZrBr2Z for CTRL's workshop schedule.

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 schedule time with her at oliviaivey.youcanbook.me.

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.

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

24 August

Introduction to quantitative social science.

- ☐ Required reading: This syllabus.

27 August

Introduction to statistical computing environments.

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

28 August (Friday)

Optional Drop-in Session.
Installing R, RStudio, and `tinytex`. Getting started on `swirl` exercises `INTRO1`.
Virtual Meeting, 11am-1pm, with Teaching Assistant.

31 August

Causal Inference I.
Reading quiz.

- ☐ Complete the First Two Weeks Checklist
- ☐ Required reading: Imai §2.1-2.4, especially §2.3
- ☐ Required reading: Notes `01-causal`
- ☐ Required exercises: `swirl() INTRO2`

3 September

Randomized experiments and observational studies.
Reading quiz.

- ☐ Required reading: Notes `02-rand-obs`
- ☐ Required reading: Imai §2.5-2.6
- ☐ Required exercises: `swirl() CAUSALITY1`

7 September

No class. Labor Day holiday.

10 September

Descriptive statistics.
A quiz over Imai, §2.3.

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

14 September

Visualization.

- ☐ Required reading: Notes `04-visualization`
- ☐ Required reading: Imai §3.1-3.4
- ☐ Required Problem Set 1 due

17 September

Bivariate statistics. Survey sampling.
Reading quiz over Chapter 3.

- ☐ Required reading: Imai §3.5-3.6
- ☐ Required reading: Notes `05-cor_z`
- ☐ Required exercises: `swirl() MEASUREMENT1`

21 September

Prediction and classification.
Reading quiz.

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

24 September

Lab I

28 September

Linear regression I.
Reading quiz.

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

1 October

Linear regression II.
Reading quiz.

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

5 October

Regression + Causal Inference.
Reading quiz.

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

8 October

Regression review, and Lab preparation.

- ☐ Required Problem Set 2 due
- ☐ `swirl() PREDICTION3`

12 October

Probability I.
Reading quiz.

- ☐ Required reading: Notes `11-prob_conditional`
- ☐ Required reading: Imai §6.1-6.2.2

15 October

Probability II.
Reading quiz.

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

19 October

Lab II

22 October

Probability III.

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

26 October

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

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

29 October

Midterm exam.

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`
- ☐ Required exercises: `swirl() UNCERTAINTY1`

5 November

Uncertainty II: Analyzing experiments.
Reading quiz.

- ☐ Required reading: Imai §7.1.5-7.1.6

9 November

Uncertainty III: Hypothesis testing.
Reading quiz.

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

12 November

Uncertainty IV: Hypothesis testing.

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

16 November

Uncertainty V: Inference about linear regression.
Reading quiz.

- ☐ Required reading: Imai §7.3-7.4
- ☐ Required reading: Notes `16-uncert_linreg`
- ☐ Recommended exercises: `swirl() UNCERTAINTY3`

19 November

Uncertainty and Testing Review.

23 November

Final project work day.
Instructor office hours.

- ☐ Required Problem Set 4 due

26 November

No class. Thanksgiving holiday.

30 November

Review and catch-up. Building regression models.
Reading quiz.

3 December

Presentations.

- ☐ Final data analysis report due