Introduction to Political Research
Government 310

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Course Information

Government GOVT 310
Introduction to Political Research
Section 002: Monday and Thursday, 9.45–11.00am, Kerwin Hall 105

Instructor Information

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Victoria Bishop
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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.

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Learning Objectives

By the end of the course, you should be able to

- Translate political phenomena into quantitative hypotheses
- Differentiate causal from descriptive statistical analyses
- Understand the value and limitations of specific quantitative methods
- 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. *Quantitative Social Science: An Introduction*. Princeton University Press, Princeton, NJ, 2017.

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 often be time in class to pose your specific questions about R coding, however. As such, you may want to bring a laptop to class to try out new code, to update your code files, etc. That said, I expect to spend most of our time on handouts that you can write on directly. Although the experiments are relatively small, longhand writing on paper 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, however, 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 four components: problem sets (30%), labs (30%), 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, quizzes, and Slack participation (10%). These four components each will be scored 0, 1, 2, 3, or 4, roughly representing the following outcomes:

- 0: absence of a good-faith effort to complete the work; failure to complete the work on time; demonstrates mastery of very little of the material.
- 1: a timely, good-faith effort to complete the work that demonstrates mastery of a small part of the material.
- 2: a timely, good-faith effort to complete the work that demonstrates mastery of more than half of the material.
- 3: a timely submission that demonstrates mastery of most of the material.
- 4: an excellent submission that demonstrates mastery of virtually all of the material.

You should think about these scores as being roughly scaled like grade point averages. A 3 out of 4 represents a B, not a 75% C.

A summary of the course assessments is in Table 1.

Assignment	Weight	Due date
Problem Sets (4)	30%	Feb 5, Mar 1, Apr 12, Apr 19
Labs (3)	30%	Feb 15, Mar 8, Mar 26
Final paper and defense	30%	Apr 25
Participation	10%	
(Attendance, Slack, quizzes, paper memo, `swirl` exercises)		
Quiz		Feb 1, ???
Memo		Mar 22

Table 1: Course Assessment Summary

No late work will be accepted. 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.

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.

Problem Sets

The four problem sets should be completed outside of class. You should submit a printed out hard copy of your solution set at the start of the class in which the problem set is due. You may also submit your solutions to the course Blackboard site under Content/Assignments/Problem Sets/[PS number]. We recommend this additional step as a way of creating a backup of your final submission that is visible to the instructors. You may work with others on the problem sets, but every keystroke of your submission must be your own.

Labs

The three labs will take place in class. 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 Blackboard page, at Content/Assignments/Labs/[Lab number].

Final Project

For the final project, you will have the exciting opportunity to engage in original political science research using real 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 a strong 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 one of these 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 to the class in one of the last two meetings. 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 the spring break, but you should start thinking about your project and partner soon.

You will present your final project to the class in one of our last two scheduled sessions. The best projects will be invited to present their work to city officials, particularly representatives of the Office of the City Administrator, including The Lab @ DC, the Performance Team, and others.

Your project should represent original data analysis, and should address a question of interest to policymakers and/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.

Software, Statistics, Data, and Literature Support

The primary 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.

Course Evaluation

The course evaluation will take place in class towards the end of the semester. Students who submit the evaluation will earn one percentage point toward the participation grade.

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

18 January

Introduction to quantitative social science.

- ☐ Required reading: This syllabus.

22 January

Introduction to statistical computing environments.

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

25 January

Causal Inference I

- ☐ Complete the First Two Weeks Checklist
- ☐ Required reading: Notes `01-causal`

- ☐ Required reading: Imai §2.1-2.4, especially §2.3
- ☐ Required exercises: `swirl() INTRO2`

29 January

Randomized experiments and observational studies.

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

1 February

Descriptive statistics. A quiz over Imai, §2.3.

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

5 February

Visualization.

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

8 February

Bivariate statistics. Survey sampling.

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

12 February

Clustering.

- ☐ Required reading: Imai §3.7-3.8
- ☐ Required exercises: `swirl() MEASUREMENT2`

15 February

Lab I

19 February

Prediction and classification.

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

22 February

Linear regression I.

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

26 February

Linear regression II.

- ☐ Required reading: Notes `09-linear2`
- ☐ Required reading: Imai §4.3
- ☐ `swirl() PREDICTION3`

1 March

Regression + Causal Inference

- ☐ Required reading: Notes `10-linear_exps_RDD`
- ☐ Required reading: Imai §4.4
- ☐ Required Problem Set 2 due

5 March

Probability I

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

8 March

Lab II

19 March

Probability II.

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

22 March

Probability III

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

26 March

Lab III

29 March

Final project work day

2 April

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

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

5 April

Uncertainty I: Standard errors and confidence intervals

- ☐ Required reading: Notes `14-uncert_ci_t`
- ☐ Required reading: Imai §7.1
- ☐ Required exercises: `swirl() UNCERTAINTY1`

9 April

Uncertainty II: Hypothesis testing

- ☐ Required reading: Notes `15-uncert_nhst`
- ☐ Required reading: Imai §7.2 (especially §7.2.3 and §7.2.4)
- ☐ Required exercises: `swirl() UNCERTAINTY2`

12 April

Uncertainty III: Hypothesis testing

- ☐ Review Imai §7.1 and §7.2 as needed
- ☐ Required Problem Set 3 due

16 April

Uncertainty IV: Inference about linear regression

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

19 April

(Catch up and review)

- ☐ Required Problem Set 4 due

23 April

Discovery: Selected topics in text analysis, networks, and spatial data

- ☐ Required reading: Imai §5.1-5.3 (OK to read for the big ideas)
- ☐ `swirl() DISCOVERY1` or `DISCOVERY2` or `DISCOVERY3`

26 April

Presentations

- ☐ Final data analysis report due

30 April

Presentations and Conclusions.

2-8 May

Select presentations to DC city policymakers.
Location: John A. Wilson Building
1350 Pennsylvania Ave NW
Washington DC 20004
(near Metro Center station on the Red Line)