

## Political Science 270: Understanding Political Numbers

Instructor: Rochelle Snyder

University of Wisconsin-Madison, Spring 2021

E-mail: [rsnyder4@wisc.edu](mailto:rsnyder4@wisc.edu)

Office Hours: Tuesdays, 2:00-4:00 PM

BBCollaborate “Course Room”

Lectures: MW 3:30-4:20 PM (remote)

BBCollaborate on Canvas

<https://canvas.wisc.edu/courses/238288>

TA: Priyadarshi Amar

E-mail: [pamar@wisc.edu](mailto:pamar@wisc.edu)

Office Hours: Wednesdays, 9:00-11:00 AM

Sections 302, 303, and 304

TA: Juan Qian

E-mail: [jqian3@wisc.edu](mailto:jqian3@wisc.edu)

Office Hours: Wednesdays, 9:00-11:00 AM

Sections 305, 306, and 307

### Course Description

Quantitative data analysis is central to the study of political science. With the introduction of new statistical computing tools and an explosion in the amount of data available to researchers, learning how to conduct and interpret quantitative analyses has become an essential skill for all political science students. In this course, you will learn how to visualize, describe, and analyze data using the open-source statistical computing software R. You will gain skills in analyzing data and interpreting quantitative analyses of political data and social science questions. This includes both the coding skills necessary to conduct analyses and the critical thinking skills necessary to design your own analyses and interpret those of others.

The main assignment for the course is a research paper in which you will propose a research question in political science, identify and clean a dataset that will allow you to answer your question, conduct quantitative analyses of your data, and present and analyze the results. In addition to developing your skills in conducting your own quantitative analyses, the insight you will gain from this hands-on experience will aid you in critical interpretation of quantitative knowledge in political science.

*Official Course Description:* How numbers and statistics are used in electoral strategies, political debates and legal proceedings. Presents basic tools of analysis and how to use them.

*Requisites:* Satisfied Quantitative Reasoning (QR) A Requirement

*Course Designations:*

Gen Ed – Quantitative Reasoning Part B

Breadth – Social Science

Level – Elementary

L&S Credit – Counts as Liberal Arts and Science credit in L&S

*Credits:* 3

This class meets for three, 50-minute class periods (two lectures and one discussion section) each week over the spring semester and carries the expectation that students will work on course

learning activities (reading, writing, problem sets, studying, etc.) for about 2 hours out of the classroom for every class period. This course meets the traditional Carnegie definition for how credit hours are met.

## Learning Outcomes

The overall aim of this course is to help you become thoughtful consumers and producers of quantitative analyses in political science. Specifically, by the end of this course, you will be able to:

- Propose research questions and hypotheses related to political science
- Test these hypotheses using appropriate statistical techniques, including linear and logistic regression models
- Understand which statistical methods allow political scientists to make causal claims and why
- Interpret and evaluate data visualizations, quantitative models, and statistical analyses in political science research
- Write and annotate clean and reusable R code

These learning outcomes are specific versions of the general QR-B course learning outcomes.

## Assignments

The main assignment is a **research paper** in which you propose a research question related to political science and answer it using quantitative analysis, namely a suitable dataset and statistical analysis technique.

The research paper will be completed in three parts:

- 1) A *research proposal* (due on March 5) in which you propose a research question, explain its importance in the field of political science, and identify a hypothesis that you plan to test.
- 2) A *data description section* (due on April 11) in which you identify the data that you will use to answer your research question, manipulate and tidy the data to suit the needs of your analysis, and provide descriptive statistics and visualizations of your data.
- 3) An *analysis* of your data that answers your research question, due together with the research proposal (which will serve as your introduction) and data section as the final research paper on May 5.

You will also complete a brief **peer review exercise** as part of the final project, which will involve reviewing a draft of a peer's data section and providing useful feedback on their presentation of the data. The exercise will be completed in lieu of sections during the week of March 29 and due no later than 11:59 PM on April 1, before the dataset is due on April 11.

To build your skills in R and solidify core theoretical concepts that you will use in your research paper, you will complete six **problem sets** in the first part of the semester. The problem sets are designed to help you master data visualization, data manipulation and tidying, basic methods of

statistical analysis, and presentation of your code and findings. Problem sets will be posted on Sundays (after the topics in the problem set have been covered in lecture and before they have been covered in section) and due no later than the following Sunday at 11:59 PM. You are strongly encouraged to review the problem sets before section so that you can ask any questions that you have about the material at that time. Due dates for problem sets are listed in the course schedule below.

Detailed instructions for the assignments will be provided as each assignment approaches. All assignments will be completed using R Markdown, a document format that we will show you how to use in the first weeks of the course.

**Readings** for each week are also listed in the course schedule below and should be completed before the week's lectures. Most will be from the textbook, *Quantitative Social Science: An Introduction*, and will cover both theoretical concepts and R topics. A few additional readings throughout the semester will follow a similar format but come from online resources. Other readings will be drawn from academic journal articles in political science and will serve to further illustrate the application of course concepts.

## **Grading**

Grading Scale:

A: 93 – 100

AB: 88 – 92.5

B: 83 – 87.5

BC: 78 – 82.5

C: 70 – 77.5

D: 60 – 69.5

F: 0 – 59.5

Assignment Weighting:

Problem Sets – 30% (six at 5% each)

Research Paper – 50% in total

- Research proposal – 5%
- Data description – 15%
- Final project – 30%

Peer Review Exercise – 5%

Section Attendance and Participation – 15%

## **Course Website**

We will rely heavily on the course's Canvas webpage for lectures, sections, assignments, discussion boards, communication, and other matters related to the course. Lectures and sections will be held synchronously using the BBCollaborate feature in Canvas. Assignments, including all problem sets, will be uploaded to Canvas, and you will turn in your completed assignments

via Canvas as well. Please check Canvas (and your e-mail) regularly throughout the semester for updates and other important information about the course.

### **Discussion/Lab Sections (remote)**

In section, you will view additional demonstrations of topics in R and have the opportunity to learn R topics hands-on under the guidance of your TA. Activities and demonstrations in section will be crucial in facilitating your understanding of course concepts and ensuring that you can complete problem sets and your final paper assignment successfully. Attendance in section is mandatory, and both attendance and engagement in section will be tracked by your TA.

Sections will cover R topics discussed in the previous week's lectures to ensure that all students have had equal exposure to lecture material before applying it in section. Sections will not meet the first week of classes (January 25-29).

### **Required Textbooks and Software**

The main textbook for the course is *Quantitative Social Science: An Introduction* by Kosuke Imai (ISBN: 9780691175461). Physical copies of the textbook are available for purchase from the University Bookstore and various online retailers of books. The e-book version may also be purchased or rented through VitalSource or Perusall (ISBN: 9781400885251).

We will also be using the open-source statistical software R, along with RStudio. We will help you download this software in the first week of the semester.

### **How to Get Help in This Course**

*Office Hours:* Office hours are for you. These are designated times when instructors sit in their offices (or, in the case of this semester, a virtual space) and wait for students to stop by and ask questions about the course material. You will almost certainly have questions about the material in the course. Please take advantage of this opportunity to ask them! I would also be happy to answer any questions you may have about other elements of your academic and professional lives.

*Canvas Discussion Boards:* We will utilize the discussion boards on Canvas as a forum for you to discuss specific issues you are having with R. Because R users typically encounter similar questions, errors, and other issues when working in R, the discussion boards will serve as a space for you to share these common issues with one another and to share any solutions that you have found. Each weekly course topic, regardless of whether a problem set has been assigned for that week, will have a designated discussion board for you to share any problems you are having with the R topics that were covered in lecture and section for that part of the course. Previous weeks' discussion posts will remain available as a resource for use later in the semester. If you have additional questions about a topic after we have already covered it in class (i.e. when you are working on your research project), please post your questions in the discussion thread related to that topic.

*Peer Tutoring:* Peer tutoring is an opportunity for you to get help with course material from peers who have been hired to help with the course. Peer tutoring will take place in small groups via BBCollaborate each week. Sessions will focus on providing answers to your questions about problem sets and other course material. Sign-up sheets for sessions and additional information will be circulated by Political Science Department staff throughout the semester.

### **Academic Integrity**

By virtue of enrollment, each student agrees to uphold the high academic standards of the University of Wisconsin-Madison; academic misconduct is behavior that negatively impacts the integrity of the institution. Academic misconduct also impedes your own ability to successfully learn the course material. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these previously listed acts are examples of misconduct which may result in disciplinary action. Examples of disciplinary action include, but is not limited to, failure on the assignment/course, written reprimand, disciplinary probation, suspension, or expulsion.

Collaboration with other students on coding matters is encouraged, as is utilizing available online resources to help with coding issues, as long as you do not copy large sections of someone else's code. Your code and annotations, like all other written work you complete for the course, must be your own. If you have any questions about what constitutes academic misconduct in this context, including questions about how to cite sources in a paper, contact me or your TA.

### **Accommodations for Students with Disabilities**

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. You are expected to inform me of any need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. I will work either directly with you or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

### **Other Considerations**

Your success in this class is important to me. We are all experiencing this semester under the unusual circumstances of remote instruction necessitated by the COVID-19 pandemic. If you are experiencing any health issues, technological problems, emergencies, or other circumstances that will affect your ability to do your best work in this course, please let me know as soon as possible. You may explain the circumstances in whatever degree of detail is most comfortable for you. All I will need to know in this case is how to arrange the best possible accommodations for your situation.

## Course Schedule

*I reserve the right to modify the below schedule as necessary as the semester progresses.*

### **Week 1 (January 25 and January 27)**

#### **Course Introduction and Overview of R**

- Reading: QSS Chapter 1
- No sections this week

### **Week 2 (February 1 and February 3)**

#### **Visualizing Data**

- Readings: [Data Visualization: A Practical Introduction, Chapter 1](#) and [R for Data Science, Chapter 3](#)
- Problem Set 1 due February 14

### **Week 3 (February 8 and February 10)**

#### **Causality Part I: Randomized Controlled Trials**

- Reading: QSS Chapter 2 (Sections 2.1-2.4)
- Problem Set 2 due February 21

### **Week 4 (February 15 and February 17)**

#### **Causality Part II: Observational Studies**

- Reading: QSS Chapter 2 (Sections 2.5-2.7)
- Problem set 3 due February 28

### **Week 5 (February 22 and February 24)**

#### **Measurement**

- Reading: QSS Chapter 3 (Sections 3.1-3.6)
- Problem Set 4 due March 7

### **Week 6 (March 1 and March 3)**

#### **Regression Part I: Linear Regression**

- Reading: QSS Chapter 4 (Section 4.2)

#### **Research Proposal due March 5 by 11:59 PM**

### **Week 7 (March 8 and March 10)**

#### **Regression Part II: Regression and Causation**

- Reading: QSS Chapter 4 (Section 4.3) and Sen and Wasow (2016), “Race as a Bundle of Sticks: Designs that Estimate the Effects of Seemingly Immutable Characteristics”
- Problem Set 5 due March 21

### **Week 8 (March 15 and March 17)**

#### **Logistic Regression**

- Reading: [Logistic Regression](#) and [Ordinal Logistic Regression](#)
- Problem Set 6 due March 28

**Week 9 (March 22 and March 24)**

**Probability and Sampling**

- Reading: QSS Chapter 6

**Week 10 (March 29 and 31)**

**Uncertainty Part I: Estimation**

- Reading: QSS Chapter 7 (Section 7.1)
- No sections this week; peer review exercise due by April 1 at 11:59 PM

**Week 11 (April 5 and 7)**

**Uncertainty Part II: Hypothesis Testing**

- Reading: QSS Chapter 7 (Section 7.2)

**Project Data Description due April 11 by 11:59 PM**

**Week 12 (April 12 and April 14)**

**Uncertainty Part III: Linear Regression, Revisited**

- Reading: QSS Chapter 7 (Section 7.3-7.4)

**Week 13 (April 19 and April 21)**

**Spatial Data**

- Reading: QSS Chapter 5 (Section 5.3)

**Week 14 (April 26 and April 28)**

**Polling and Election Outcomes and Course Wrap-Up**

- Reading: QSS Chapter 4 (Section 4.1.3)

**Final Project due May 5 by 12:05 PM (the end of the final exam period for the course)**