

POLS 40811: Quantitative Political Analysis Using R (FALL 2021)

Instructor: Rachel Porter

Email: rachel.porter@nd.edu

Class: Monday and Wednesday, 9:30 - 10:45

Office Hours: Monday and Wednesday, 11:00 - 12:30

1 COURSE DESCRIPTION

The Information Revolution has dramatically expanded the volume of information we have about the world around us. Social scientific analytical skills are transforming many sectors—business, journalism, law, public policy, health care, and finance, to name but a few—and are more valued now than ever. The broad learning objective for this course is to help students develop the tools they need to be informed participants and active leaders in data-driven sectors. Throughout the course, we'll discuss the complexities of generating good research designs, starting with how to ask interesting questions and how to measure concepts of interest to social scientists. We'll discuss the challenges and limitations of gathering good data to test these theories as well as various statistical tools that can be used to evaluate our theories. Throughout the course, we'll use what we've learned to think critically about the use and abuse of data by analysts, reporters, politicians, and policy advocates. As such, not only will you be learning to do your own analysis this semester, but also learning to evaluate such information when it's presented in the media.

The target audience for this course is undergraduate students with interest in the social sciences (not only Political Science), who want to use quantitative approaches to solve important social problems while simultaneously developing marketable, analytical skills. This course is cross-listed with the Data Science Minor and may count toward one of the two elective courses required for sequence completion.

2 CLASS ATTENDANCE POLICY

Class will be held synchronously every week from 9:30 a.m. to 10:45 a.m. In light of these uncertain and unprecedented times, I will not have a hard and fast attendance policy. *However*, having taught this class across multiple semesters, I would **highly suggest attending class as frequently as possible**. Learning to code in statistical programming software is like learning a new language, it can be very challenging. This class will cover a large amount

of material very quickly. Being present, asking questions, and tuning in to lectures is the surest way to be successful in this class.

SOFTWARE

Much of the hands-on work we will do in this class requires us to use computers, so I ask that you bring your laptops to class each day. Specifically, we will make use of the R statistical computing environment to analyze data and create graphics over the course of the semester. RStudio is a popular editor that allows you to open, edit, and save R text files, making it much easier to work with R. I will use RStudio to demonstrate in class, and I recommend you download and use it as well. To access these programs:

- **R:** Download precompiled binary distributions at <http://cran.us.r-project.org>
- **RStudio:** Download RStudio Desktop at <http://www.rstudio.com/products/rstudio>

REQUIRED MATERIALS & ADDITIONAL RESOURCES

The textbook has extensive online materials for learning to use R. There are also a number of free supplemental resources available through UNC that offer assistance:

- **Required:** Imai, Kosuke. 2017. *Quantitative Social Science: An Introduction*. Princeton: Princeton University Press.
- <http://qss.princeton.press/student-resources-for-quantitative-social-science>
- R Open Labs: <http://ropenlabs.web.unc.edu>

CHANGES TO THE SYLLABUS

I reserve the right to make changes to this syllabus at any time. If changes are made, students will be informed through email and verbally in class, and a new syllabus document will be posted on Canvas.

3 GRADING & COURSE REQUIREMENTS

Your grade for the course will be determined by performance in five areas: class participation, problem sets, DataCamp exercises, exams, and a critical analysis project.

GRADING

Final grades for the course will be based on the following scale. I reserve the right to make adjustments to individual grades based on overall performance in the course and/or extenuating circumstances. There will be no extra credit provided.

- A: 93-100
- A-: 90-92
- B+: 87-89
- B: 83-86
- B-: 80-82
- C+: 77-79
- C: 73-76
- C: 73-76
- C-: 70-72
- D+: 67-69
- D-: 60-62
- F: 59 or below

COURSE GRADE BREAKDOWN

The proportion of each assignment as part of your overall grade is as follows:

- Assigned Work (DataCamp): 10%
- Exams: 40%
 - Exam One: 15%
 - Exam Two: 25%
- Problem Sets (4): 20%
- Critical Analysis Project: 30%
 - Preliminary Analysis: 15%
 - Paper: 15%

ASSIGNED WORK

Class time will be divided between lecture and in-class workshops. The way you are going to learn best, especially when it comes to working with tools for statistical programming, is through practice. Assigned work constitutes the completion (not graded for accuracy) of in-class assignments and DataCamp courses assigned throughout the semester. These assignments are due **the Sunday after they have been assigned**. For instance, DataCamp Introduction to R — 1 & 2 will be assigned August 10th. This means that these tutorials must be completed by August 16th at 11:59 p.m. Work submitted late will be given 50% credit; work submitted on time (and completed) will be given 100% credit.

PROBLEM SETS

Homework assignments will be assigned throughout the semester. The problem sets will be posted to Sakai, and due electronically on Sakai before the start of class on the due date. Late homework will be subject to a 10% penalty each additional day it is late. Late homework will no longer be accepted after the answer key is posted to Sakai.

CRITICAL ANALYSIS PROJECT

Each student will complete a critical analysis project near the end of the semester; this project will test students on the concepts they have learned throughout the semester.

- **Preliminary Analysis (15%):** Each student has the option to turn in their R script for their critical analysis project to receive feedback before the final due date. This script must be submitted by November 4th and will be returned by November 9th. The final R script (i.e. preliminary analysis) is due on November 16th.
- **Paper (15%):** The final research paper is due on November 16th. This paper should be approximately 10 pages, double-spaced, not counting any tables, figures, or references.

EXAMS (40%)

There will be two exams; the first worth 15% and the second worth 25% of your final grade. The first exam will be made available on October 11th at 9:00 a.m. and will be due on October 12th at 11:59 p.m. The second will be made available on the day of the final exam.

4 EXPECTATIONS

COMMUNICATION

I am very happy to meet with students outside of class time. Whether it be to discuss concerns about the course, remediation with the material, or simply to engage further with the topic, please feel free to stop by JNH 2057 during my office hours. If you are unable to meet during my office hours, which are listed at the top of this syllabus, please email me to set up a time to talk. Email is the best mode of communication with which to reach me. While I do my best to respond to emails as quickly and thoroughly as possible, please expect a response within 24 hours and plan accordingly.

Office hours are an important resource that should be utilized to improve understanding of materials or ask more personalized questions. Office hours before an exam will be held at regular times and, unless noted by me, no additional office hours will be held - so plan accordingly. *After I have graded and returned your assignments, there is a twenty-four hour moratorium before I will answer questions about that assignment.*

STUDENTS WITH DISABILITIES

Students with disabilities needing academic accommodation should visit the following link <https://dulac.nd.edu/academic/disabilities/> to learn about proper protocols and channels for requesting academic accommodations.

ACADEMIC INTEGRITY

This class follows the binding Code of Honor at Notre Dame. The graded work you do in this class must be your own. In cases where you collaborate with other students, make sure to fairly attribute their contribution to your project. Students should familiarize themselves with these guidelines: <http://nd.edu/~hnr/code/docs/studentguide.pdf>.

Programming is a skill that takes time and practice to develop. Whenever you encounter a new problem, you will have to grapple with it and reach an understanding of what it is asking before you can reach a solution. Discussing the problem with other people is permitted and even encouraged. When it comes time to actually write your code to solve the problem, all work must be your own. Do not copy anyone else's code, and do not share your code with others. Identifying plagiarized code is surprisingly easy, even after renaming variables or rearranging individual pieces of code. Some in-class work and the critical analysis project is collaborative, and collaborative writing of code is permitted.

5 SCHEDULE

Date	Class Topic	Readings & Assignments
08/10	Student Meetings	DataCamp: Introduction to R — 1 & 2
08/12	Student Meetings	DataCamp: Introduction to R — 3 & 4
08/17	Working In R: The Basics	In-Class Exercise: New Years Resolutions
08/19	Working In R: The Basics	DataCamp: Introduction to R — 5 & 6
08/24	Working In R: Analyzing Data	Problem Set 1 Due
08/26	Working In R: Analyzing Data	In-Class Exercise: Election Turnout
08/31	Working In R: Conditionals	DataCamp: Intermediate R — 1 & 2 In-Class Exercise: Soccer Players Problem Set 2 Due
09/02	Working In R: Conditionals	
09/09	Lecture: Descriptive Statistics	
09/14	Bringing it All Together	In-Class Exercise: Class Size Efficacy
09/16	Bringing it All Together	Problem Set 3 Due
09/21	Lecture: Measurement	
09/23	Exam Review	
09/28	Exam I	Submit Exam I by 11:59 P.M.
09/30	Data Visualization in R	DataCamp: Visualization with ggplot2 — 1:4
10/05	Lecture: Theories & Prediction	
10/07	Lecture: Regression I Part I	
10/12	Lecture: Regression I Part II	In-Class Exercise: Interpreting OLS
10/14	Lecture: Regression II	
10/19	Working in R: Regression	
10/21	Working in R: Regression	In-Class Exercise: Immigration
10/26	Critical Analysis Project	
10/28	Extended Office Hours	Problem Set 4 Due
11/02	Lecture: Uncertainty I	
11/04	Lecture: Uncertainty II	OPTIONAL: R Script Feedback
11/09	Working in R: OLS & ggplot2	
11/11	Extended Office Hours	
11/16	Exam Review Day	