

# Poli 281: Quantitative Research in Political Science

Instructor: Rob Williams

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University of North Carolina at Chapel Hill

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Meetings: Tuesday, Thursday 11:00-12:15, Mitchell 205

## Contact Information

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## Office Hours

Tuesday 1:00-2:30, Wednesday 12:30-2:00

And by appointment

## 1 COURSE DESCRIPTION

This course is designed to achieve three objectives: (1) introduce you to research and quantitative analysis in political science, (2) help you become critical consumers of quantitative analysis used in political and policy-oriented reporting, and (3) give you the ability to answer questions of social scientific importance using data. 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 our theories and learn various statistical tools that can be used to evaluate them. 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. This course fulfills the Quantitative Intensive (QI) requirement and counts as a research methods course for completing the Political Science major. It is a prerequisite for Poli 381: Data in Politics II which will be offered in future semesters.

### 1.1 CHANGES TO THE SYLLABUS

I reserve the right to make changes to this syllabus at any point in the semester. If the syllabus changes, I will inform you in class and via email. An updated syllabus will also be posted on Sakai.

## 2 COURSE REQUIREMENTS AND GRADING

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.

### 2.1 GRADES

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.

### 2.2 COURSE GRADE BREAKDOWN

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

- 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

- Participation and In-Class Work: 15%
- Problem Sets: 15%
- DataCamp: 5%
- Exam One: 10%
- Exam Two: 20%
- Critical Analysis Project: 35%
  - Proposal: 5%
  - Preliminary Analysis: 5%
  - Presentation: 10%
  - Paper: 15%

### 2.3 PARTICIPATION AND IN-CLASS WORK (15%)

Class time will be divided between lecture and in-class activities. The way you are going to learn best, especially when it comes to working with statistical software, is through practice. Active involvement in activities is absolutely crucial to success in this class — not to mention, an easy way to boost your participation grade. We will be doing a lot of in-class work, both individually and in groups. While attendance is not graded directly, absences will hurt your grade as you cannot earn participation points if you are not in class. If you know you are going to be absent for an excused reason, email me before class. When your absence is excused, you can make up the in-class work for credit. When your absence is unexcused, you cannot make the in-class work up and you will receive a zero. **In-class work will be due before the start of the next class meeting.**

### 2.4 PROBLEM SETS (15%)

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.**

### 2.5 DATACAMP (5%)

We will be using DataCamp for the Classroom, an online learning platform for data science, to help get you up to speed with R. You will be able to access DataCamp through our course's Sakai page. **DataCamp assignments must be completed before the start of class on the due date.**

### 2.6 CRITICAL ANALYSIS PROJECT (35%)

The research project is a primary focus of this course and, as such, makes up just over a third of the overall grade. This project will allow you to directly apply the lessons from this course to a political issue or question that you care about. You will be assigned to a group of 3-4 students and work together to select a relevant political issue or question, theorize about some factors that might explain that issue or help answer the question, choose a (provided) data set appropriate for the question, and analyze the data to see whether your expectations are supported. The project and overall distribution of points are divided into four parts:

- **Project Proposal (5%):** Each group must turn in a two-page, double-spaced paper proposal by February 14. This proposal should include a brief description of the issue or question about

public opinion you plan to examine. Make sure to address why this topic is interesting to you and/or important within political science. This proposal should include an initial description of your research question, theory, and hypotheses.

- **Preliminary Analysis (5%):** Each group must turn in a preliminary data analysis, which includes the key statistics used to test your hypotheses, by April 16. This assignment, totaling approximately two or three double-spaced pages, requires a brief description of the data used, a brief explanation of the statistical methods you used, the relevant statistical outputs you computed, and an indication of whether and why the outputs support or oppose your paper's hypotheses.
- **Presentation (10%):** At the end of the semester, each group will give a PowerPoint presentation about its research on April 29. Each presentation should be approximately 12-15 minutes, and time will be left for questions and answers after each group presents.
- **Paper (15%):** The final research paper is due on April 29 before presentations begin. This paper should be approximately 10 pages, double-spaced, not counting any tables, figures, or the bibliography.

Each member of the group will receive approximately the same grade on all parts of the research project; I expect each member, in turn, to make an equal contribution throughout the process. You will be asked to evaluate your group members and yourself at each stage of the process and the evaluations provided will have an impact on your grade. So, make sure that do you part for the project. We will discuss expectations for each section in more detail throughout the semester.

## 2.7 EXAMS (30%)

There will be two midterm exams; the first worth 10% and the second worth 20% of your final grade. The first will be on February 28 and the second will be on April 18. Note that this is not the final exam slot. We will be using the final exam slot for group presentations. The format of each exam will be discussed in class before the exam.

## 2.8 UNEXCUSED ABSENCES AND EXAMS

You are required to be present for all scheduled exams. The only allowable exception to this policy is a documented emergency. If at all possible you should contact the instructor before the exam to discuss the emergency, provide documentation, and schedule the make-up.

# 3 EXPECTATIONS

## 3.1 COMMUNICATION, OFFICE HOURS, QUESTIONS ABOUT GRADES

I am very happy to meet with students outside of class time. Whether it be to discuss concerns about the course or questions about the material, please feel free to stop by 459 Hamilton Hall during my office hours (Tuesday 1:00-2:30, Wednesday 12:30-2:00). If you are unable to meet during my office hours please email me to set up a time to talk. Email is the best way to reach me. Please note that email is only for brief communications. If you have longer questions, come to my office hours or schedule a meeting with me. **I will not answer any questions about grades until 48 hours after I have returned a graded assignment.**

## 3.2 CLASS DISCUSSIONS

All conversation during class must be civil, reasoned, and respectful of others' opinions. An important component of this course is discussing ideas with, learning from, and collaborating with your peers. As such, I want to create an environment where you feel comfortable, confident, and excited about sharing your thoughts and applying what you have learned to issues you care about. I encourage students to challenge themselves to think about, voice, and debate new ideas, while maintaining norms of civil discourse. I know we are up to this challenge.

## 3.3 TECHNOLOGY USE

The use of cell phones or other mobile communication devices is prohibited during this class, without exception. Laptops, on the other hand, are required. We are going to be doing a lot of work on the computer, especially with statistical programming software. Please email or come talk to me if you do not have access to a laptop and we will find a solution. Please bring your laptop to every class.

## 3.4 STUDENTS WITH DISABILITIES

Students with disabilities needing academic accommodation should (1) contact the office of Learning Disabilities at UNC: <http://www.unc.edu/depts/lds/index.html> and (2) bring a letter to me indicating the need for accommodation and what type during the first week of class.

## 3.5 ACADEMIC INTEGRITY

According to UNC's Instrument of Student Judicial Governance, "It shall be the responsibility of every student enrolled at the University of North Carolina to support the principles of academic integrity and to refrain from all forms of academic dishonesty." Failure to abide by this policy may result in punitive action taken against the offending students. Consult the UNC Writing Center's handout on plagiarism (<http://writingcenter.unc.edu/handouts/plagiarism/>) to learn more on how to avoid academic dishonesty.

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. **All collaborative assignments will be clearly identified.**

## 3.6 HONOR CODE

All students participating in the class are assumed to be familiar with and adhering to the UNC Honor Code. I treat violations of the Honor Code seriously. More information is available at <http://instrument.unc.edu>.

### 3.7 COLLABORATIVE GROUP MEMBERSHIP

As explained above, students will work on the research project, including the presentation and final paper, as a group. Though time will be given in class for group members to work together on the various sections of the research project, you will still need to devote a substantial amount of time to the group project outside of class. I expect all members of the group to contribute equally to the project, and each component of the project should reflect contributions from each group member. In other words, do not simply divide up the components of the project among the members of the group. While collaborative work poses some challenges, the benefits you will gain from learning how to work together successfully as a team will serve you well in all facets of your life, from the classes you take in the future to the career you pursue after graduation.

When it comes to group work, two problems often occur: (1) one member of the group dominates the project, or (2) some members of the group “free ride” by relying on other group members to do their work for them. I will try my best to prevent both, by regularly checking in with groups about the status of their projects. If problems within the group do arise, I encourage you first to discuss them openly and honestly among yourselves to see if some resolution can be found. If problems persist, please see me.

## 4 COURSE MATERIALS

### 4.1 READING

There is one required book for this course, available in the UNC Bookstore. We rely heavily on this textbook so it is essential that you buy it.

- Imai, Kosuke. 2017. *Quantitative Social Science: An Introduction*. Princeton: Princeton University Press.

There will occasionally be readings assigned outside of the textbook. These will be posted on Sakai.

### 4.2 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>

### 4.3 SUGGESTED 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:

- <http://qss.princeton.press/student-resources-for-quantitative-social-science>

- Monogan III, James E. 2015. *Political Analysis Using R*. New York: Springer.
- R Open Labs: <http://ropenlabs.web.unc.edu>

Additional help may be found with the Odum Institute's statistical consultants at the Research Hub on the second floor of Davis Library from 9am to 6pm, Monday through Friday.

## 5 SCHEDULE

Readings and assignments are due the date of class listed.

Date	Class Topic	Readings & Assignments
1/10	Introduction and overview	
1/15	Introduction to R	Imai Ch. 1
1/17	Theory building and testing	<b>DataCamp – Introduction to R</b>
1/22	Writing R scripts	<b>DataCamp – Working with RStudio</b>
1/24	Causality and descriptive statistics	Imai Ch. 2
1/29	Causality in R	<b>DataCamp – Intermediate R</b>
1/31	Measuring what you care about	Imai Ch. 3 pp. 75-107
2/5	Visualizing univariate data in R	<b>DataCamp – Introduction to Data</b>
2/7	Applied political science research	See handout on readings for 2/7
2/12	Visualizing bivariate data in R	<b>Problem set 1</b>
2/14	Cleaning data in R	<b>DataCamp – Importing &amp; Cleaning Data</b>
2/19	Prediction	Imai Ch. 4 pp. 123-160
2/21	Linear regression	<b>Problem set 2</b>
2/26	Linear regression in R	
2/28	<b>Exam</b>	<b>Research proposal due</b>
3/5	Regression with multiple predictors	Imai Ch. 4 pp. 161-182
3/7	Regression with conditional effects	Berliner et al., 2015
3/19	Introduction to probability	Imai Ch. 6 pp. 242-265
3/21	Probability distributions	Imai Ch. 6 pp. 277-306
3/26	Bayes' Rule	Imai Ch. 6 pp. 266-277
3/28	Project group work	<b>Problem set 3</b>
4/2	Null hypothesis significance testing	Imai Ch. 7 pp. 314-369
4/4	Hypothesis testing in R	Mitchell & Martin, 2018
4/9	Regression with uncertainty	Imai Ch. 7 pp. 370-389
4/11	Project group work	<b>Problem set 4</b>
4/16	Project group work	<b>Preliminary analysis due</b>
4/18	<b>Exam</b>	
4/23	Algorithms in the wild	<b>Problem set 5</b>
4/25	Reproducibility and replication	Aschwanden & Koerth-Baker, 2016
4/29	<b>Project presentations</b>	<b>Paper due</b>