Political Science 4781

Techniques of Political Analysis

Autumn 2015

Class Time: Wed/Fri 9:30-10:50 AM
Location: Derby Hall 0125
Dates: 8/25/2015 - 12/09/2015

Instructor: Mr. Vittorio Merola
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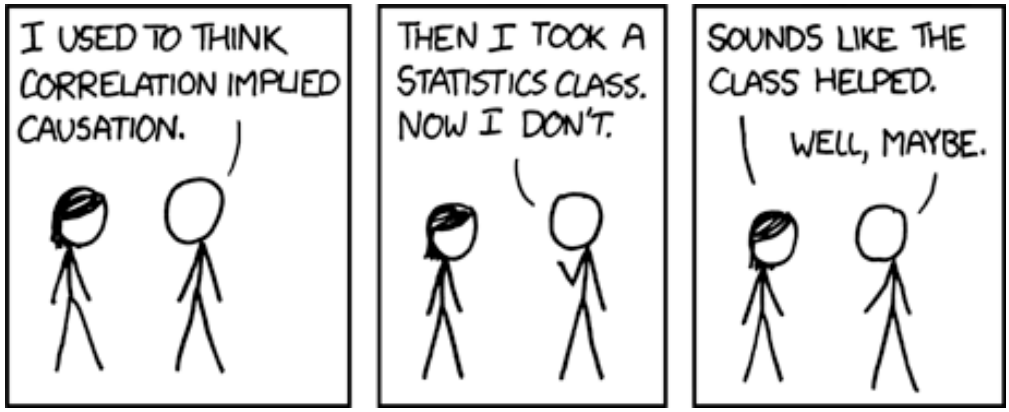
Office: 3078 Derby Hall

Office Hours: Wednesday 1.00 - 2.00 PM
Friday 11.00 - 12.00 PM



Course Description

This course introduces students to ways in which social scientists leverage **quantitative data** to answer questions about human behavior and society. We will cover a range of topics, including how to **describe data**, how to **draw inferences** from samples to populations, how to formally **test hypotheses** using data, and how to **evaluate data-based claims** in experimental and observational research. In the course, students will get **hands-on experience in analyzing data**, which will involve learning how to apply the techniques we discuss in class using a popular (and free!) statistical software program, R. While many of the examples used in the class will be related to political science, we will also use examples from other fields of study, such as sociology, psychology, sports, and the health sciences.

At the successful completion of the course, you should be able to **critically evaluate social scientific research** you come across, both in other courses and in your daily live; and **seek out and analyze data** to address research questions that interest you. Moreover, familiarity with statistical methods and statistical software is increasingly **valued by employers**. If you do well, you can add completion of the course to your CV and, in particular, that you have experience in using R.

Prerequisites

While much of this course is devoted to learning methods of statistical analysis, it is not necessary for you to have an extensive mathematical background in order to gain a thorough understanding of the material.

However, there are a couple of factors you should keep in mind when deciding if this course is the right fit for you:

- To be successful in the course, you should expect to devote considerable (though not unreasonable) time to study the material each week. Learning to use statistics is not easy, and everyone struggles at first. But the rewards, both in terms of your knowledge and analytical ability, as well as your job prospects, are definitely worth it!
- Learning how to use R can be a frustrating process. You should be willing to put in the time and effort to use it, since using R is an intergral part of the course. That said, I am here to help you learn and will, of course, provide extensive information on how to perform data analysis in R.

Course Objectives

This course satisfies the GE data analysis requirement, described by the University as follows:

> **Goals:** Students develop skills in drawing conclusions and critically evaluating results based on data.
>
> **Expected Learning Outcomes:** Students understand basic concepts of statistics and probability, comprehend methods needed to analyze and critically evaluate statistical arguments, and recognize the importance of statistical ideas.

Texts and Material

Required Texts

The following (free!) textbook is required:

- David M. Diez, Christopher D. Barr, and Mine Cetinkaya-Rundel. *OpenIntro Statistics.* CreateSpace, 3rd edition

  A PDF of the book (henceforth OI) is available for free at `https://www.openintro.org/stat/os3.php`. A paperback version can also be purchased from Amazon for under $10.

Other required material will be provided on Carmen.

Stat Trek is a help website for statistics. It has a help page on virtually all the statistics topics we'll cover and you should consult it as a secondary source on statistics topics that are giving you trouble. `http://stattrek.com`

Computer Software

Quantitative social science research requires the use of computers. Throughout the course, I will assume that you have a personal (or family) computer that you can use to complete all assignments. **If you do not have access to a personal computer, please email me ASAP.**

While there are many different statistical software packages available, we will be using a program called R, which is a free, open source programming language and environment for statistical computing. It can be downloaded at http://www.r-project.org/. To assist you in using R, I also recommend that you install RStudio, which is a free, open source interface to R that makes working with R significantly easier, particularly on Windows. It can be download it for various platforms at http://www.rstudio.org/. I will provide instructions on how to install both programs in week 1.

Quick-R is a help website for problems you may encounter when using R. `http://www.statmethods.net/index.html`

Assignments and Grading

Assessment for this course will be based on weekly quizzes, four homework assignments, a midterm exam, and a comprehensive final exam. The final course grade will be determined based on the following breakdown:

Weekly quizzes: Best 10 out of 12 @ 2.5% each = 25%
Homework assignments: 1 @ 5% and 3 @ 10% each = 35%
Midterm exam: 1 @ 15% = 15%
Final exam: 1 @ 25% = 25%

A cumulative average grade of over 90% is guaranteed at least an A-, over 80% is guaranteed at least a B-, and over 70% at least a C-. These thresholds may be lowered, but will never be raised.

Quizzes

The quizzes are meant to test your' working knowledge of the materials covered in lectures and assigned readings. The quizzes will consist of ten questions, **which you will have to answer online, through Carmen, in a maximum of 30 minutes.** Each quiz is graded out of 8 points, meaning you can answer two questions incorrectly and still receive the highest grade. If you answer more than 8 questions correctly, the extra points will be carried over, such that they can improve your quiz grade in another week (e.g. if you score 9 in one week and 7 in another, you'd get 8 points in each week, and thus, an A).

Most weeks, each quiz will consist of two sections: 1) A section which involves completing exercises from the textbook. The exercises will be provided beforehand, which means that you can complete them prior to the quiz and, thus, only have to fill in the appropriate answers during the quiz. 2) A section which involves answering multiple choice questions on the material covered during the week. The questions in this section may be randomly chosen from a larger pool of questions, which means that you and your classmates will not necessarily be asked exactly the same questions. The quizzes are open book, i.e. you are free to check the book, videos, R etc. for answers, but are not allowed to consult with your classmates during the quiz.

Quizzes are to be completed before the beginning of class on the date on which they are due.[1] **After the deadline has passed, you will not be able to take that week's quiz and will receive a score of 0**. (Protip: Plan for contingencies and do not wait until the last minute to take the quiz — no extensions will be granted due to technical difficulties). Quiz answers will be available on Carmen the morning after a quiz is due. **The lowest two scores will be dropped**.

Homework

Homework assignments are meant to assist you in developing the problem-solving, analytic, and computer skills necessary to perform modern social scientific research. Assignments will give you the opportunity to engage deeply with the course material and provide you with hands-on experience in working with real-world data in R. The four homeworks will comprise 35% of your final grade, with the worst score accounting for 5% and the rest 10% each. The schedule below contains information on when the assignments are due. Unlike the quizzes, the homeworks should be written up and handed in by the end of the class on the date when they are due. **You can hand in the homework up to three days late, but will incur a 10% penalty for the start of each 24 hour period the assignment is late.** Homework will not be accepted after the three days have passed.

You are allowed, and even encouraged, to work together on the homeworks. It is good practice to first try to develop answers on your own, and then meet in a group setting to discuss potential difficulties. However, the final write-up of the answers and the computer code which you hand in should be written by you. DO NOT simply copy computer code or answers from your classmates.

Midterm and Final Exam

The midterm exam will cover all materials presented or assigned in the first seven weeks of the course. It will take place in week 8, on Friday, 10/16, during class. It will account for 15% of your final grade.

The final exam will be comprehensive, covering all materials presented or assigned during the course. The exam will take place the last class day, on Wednesday, 12/9, during class. It will account for 25% of your final grade.

No make-up exams will be given for the final exam. If you can't take the final exam on the date specified above, you should email me ASAP (and at the latest, four weeks before the final is to take place).

Attendance Policy

We will meet twice a week during the semester. You can expect me to be prepared, give the lecture and answer questions. When you come to class, please also be prepared. I will not require attendance, but class is a resource to you. The classroom is a great place to exchange ideas, meet your classmates, and ask questions. Regular attendance is also encouraged because lectures and practical sessions are tightly linked to weekly quzzes, the homeworks and the exams. If you do not attend regularly, it will be difficult to pass the class.

[1] For example, the second week of the course we will not have class, as I will be away all week for a conference in San Francisco. Yet, the first quiz will still be due that Wednesday, 9/2. This means that you should have completed quiz 1 by 9:30 AM that day.

Extra Credit

No individual extra credit opportunities will be made available over the semester. However, **in an effort to encourage you to provide constructive feedback on the course there will be a group-wise extra credit granted if more than 75% of the students completing the course complete both their SEI and an end-of-class-survey**. Since both surveys are anonymous, everyone in the class will receive the extra credit if the threshold is passed.

Policies and Procedures

Academic Honesty

I expect all of the work you do in the course to be your own. Academic misconduct of any sort will not be tolerated and will be reported to the university committee on academic misconduct and handled according to university policy. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. For additional information, see the Code of Student Conduct: http://studentaffairs.osu.edu/resource$_c$*sc.asp*

Communication

The primary method of communication will be in-class and during office hours. Class meets twice a week, and I will have office hours twice a week as well, for one hour each (see first page of syllabus for times). The classroom is the best place to raise questions - remember, it is normal to have questions and be confused. There are no stupid questions in this class.

The offce hours should be dedicated to discussing more in-depth questions and your assignments. If you cannot attend office hours, feel free to set up an appointment, by email or in person. In fact, within the frst 4 weeks I encourage everybody to come to my offce hours at least once. Emails are a last resort! Think twice before sending an email (Subject header should always include the course number and your full name). On weekdays you can expect that I reply to your emails, within 24 hours. Be prepared to remind me, should my attention slip. I will not respond to emails over the weekend (except in urgent cases).

Disability Services

Students with disabilities that have been certified by the Office for Disability Services (`http://www.ods.ohio-state.edu/`) will be appropriately accommodated and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901.

Tips for Success

1. Complete the weekly exercises from the book prior to taking the weekly quiz. 30 minutes will not be enough to do it all at once.
2. Get an early start on homework assignments. Using R will involve some trial-and-error and having ample time to seek help from the instructor is crucial.

3. Don't be a stranger! I am here to help and am happy to answer your questions. Please come by my office hours, even if your questions seem small (which they never are).
4. Work together on the homeworks and studying for the exams. Talking things through with other people is the best way to truly learn difficult material.
5. Use all the resources available. If I can't help, and the book isn't useful, look things up online. I can guarantee you that you can find the answer online to pretty much any question you will have about the material, regardless if it is about R code or statistics.

Class Schedule

The class schedule below is tentative, and is subject to change depending on how fast we get through the material. If the schedule does change, an updated syllabus will be posted to Carmen. Readings from the textbook are denoted with a # sign - for example, OI#1.1-1.5 means that you should read sections 1 through 5 of Chapter 1 in Diez et al..

W	Dates	Topics and Readings	Assignments
1	8/26 & 8/28	**Introduction** Social SCIENCE, Data, Installing/Using R and RStudio Read: This syllabus, OI#1.1-1.5	
2	9/2 & 9/4	**Exploratory Data Analysis** NO CLASS ALL WEEK Describing Data Read: OI#1.6-1.8, and online material	Q1 (9/2)
3	9/9 & 9/11	**Probability Distributions** Normal Distribution, Binomial Distribution Read: OI#3.1, 3.2, 3.4 Recommended: OI#2.1, 2.2	Q2 (9/11)
4	9/16 & 9/18	**Statistical Inference** Sampling Distribution, CLT, Confidence Intervals Read: OI#4.1-4.2	Q3 (9/18)
5	9/23 & 9/25	**Statistical Inference II** Hypothesis Testing, Decision Errors, Significance Read: OI#4.3-4.5	HW1 (9/23) & Q4 (9/25)
6	9/30 & 10/2	**Applied Survey Research** Sampling, Biases, CPS Read: OI#1.4.2 & Freedman et al.#19,22	Q5 (10/2)

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W	Dates	Topics and Readings	Assignments
7	10/7 & 10/9	**Research Design in the Social Sciences** Causation, Experiments, Observational Studies Read: Kellstedt and Whitten#3-4	HW2 (10/7) & Q6 (10/9)
8	10/14 & 10/16	**Midterm** NO CLASS on 10/16 (Autumn Break)	In-Class Midterm (10/14)
9	10/21 & 10/23	**Inference for Numerical Variables** Difference of Means, t-test, ANOVA Read: OI#5	Q7 (10/23)
10	10/28 & 10/30	**Inference for Categorical Variables** Proportions, Chi-Squared Read: OI#6.1-6.4	Q8 (10/30)
11	11/4 & 11/6	**Simple Linear Regression and Correlation** Linear Regression, Correlation, Prediction, Outliers Read: OI#7	HW3 (11/4) & Q9 (11/6)
12	11/11 & 11/13	**Multiple Linear Regression I** NO CLASS on 11/11 (Veteran's Day) OLS, Model Selection Read: OI#8.1-8.2	Q10 (11/13)
13	11/18 & 11/20	**Multiple Linear Regression II** Interactions, Assumptions, Diagnostics Read: OI#8.3, and online material	HW4 (11/18) & Q11 (11/20)
14	11/25 & 11/27	**Thanksgiving Break** NO CLASS ALL WEEK	
15	12/2 & 12/4	**TBD & Review** Read: TBD	Q12 Due (12/4)
16	12/9	**Final Exam**	In-Class Final (12/9)

Required Readings

David M. Diez, Christopher D. Barr, and Mine Cetinkaya-Rundel. *OpenIntro Statistics.* CreateSpace, 3rd edition. [2, 6, 7]

David Freedman, Robert Pisani, and Roger Purves. *Statistics.* W.W. Norton & Company, 4th edition. [6]

Paul M. Kellstedt and Guy D. Whitten. *The Fundamentals of Political Science Research.* Cambridge University Press, 2nd edition. [7]