

# PSC 200: Data Analysis I

Fall 2020, Tues & Thurs 9:40-10:55

**Prof. Curtis S. Signorino**

Office Hours: Mon 1-2pm, Thurs 12:30-2:30

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## Course Description

How do we evaluate empirically the claims politicians make? How do we determine whether theories of political behavior are supported by evidence? What do reporters mean when they refer to a poll being accurate to  $\pm 3\%$ ? In this course, students are introduced to data analysis, statistical inference, and research design relevant to political science research. Topics will include variable measurement, descriptive statistics, confidence intervals, hypothesis tests, correlation, and regression analysis.

**Course Meeting and Credits.** This course follows the College credit hour policy for four-credit courses. We will meet online via Zoom twice a week: Tues & Thurs, 9:40-10:55. There is no separately designated day for labs. Rather, the normal Tues/Thurs sessions will be a mix of lecture, practice sessions, and computer labs. During the labs, students will receive computer instruction, analyze data, and start on new homework assignments. The remaining credit hour is fulfilled through independent reading and completion of the homeworks.

**Zoom links.** The Zoom links for class meetings are provided on Blackboard. Note that Zoom will ask you for the password (20020) for the Tues/Thurs classes. Zoom links are also provided on Blackboard for the instructor's and TAs' office hours.

**Prerequisites:** PSC 200 is intended for students with no (or little) prior experience in statistics. Calculus, matrix algebra, and computer programming are not required and will not be used during the semester. Students are only expected to be familiar with basic (e.g.,

high school level) algebra.

In that spirit, students may *not* take PSC 200 if they have either (1) scored a 4 or 5 on the Advanced Placement exam in Statistics or (2) already taken another UR course in statistics, such as ECO 230, PSC 205, PSY/CSP 211, or STT 211/212/213/214. Students who fall into one or both of these categories should ask me for alternative courses to take.

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## Grading

Course grades will be based on a series of homeworks (72%), a final exam (25%), and class participation/attendance (3%). The lowest of the homework grades will be dropped when calculating the final course grade. This is to allow for illness or other such unforeseen events. That said, you are strongly encouraged to complete ALL homework assignments.

**Homeworks.** Homeworks will typically be handed out during regular class time, at which point a “lab” will be held. The lab allows students to ask the instructor and TAs questions about the homework before taking it home to complete it. Homeworks will normally be due a week after they are handed out. Students should submit their homework answers via Blackboard. Students may also find their homework grades on Blackboard.

Late assignments will be penalized one half-grade (e.g., B to B-) for each day they are late. Homeworks more than seven days late will receive a grade of zero. All assignments are to be completed individually.

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## Readings

Students are responsible for keeping up with the reading each week. Whenever possible, I will post to Blackboard pdf’s of any readings or lecture notes. Texts used for this course will include

### Required:

- Alan Agresti, *Statistical Methods for the Social Sciences*. 5th edition.

This is the main textbook for the course. The 3rd and 4th editions are perfectly acceptable as well. If you do use the 3rd or 4th edition, please make sure to compare the table of contents to that of the 5th edition and do the appropriate reading each week.

- John Verzani, *SimpleR: Using R for Introductory Statistics*.

This is a free pdf about R, the computer program we'll be using for statistical analysis. It is already available in the Texts folder on Blackboard with added chapter numbering in the table of contents.

**Recommended:**

- David M. Diez, Mine Cetinkaya-Rundel, and Christopher D. Barr. OpenIntro Statistics (OIS). 4th ed. The pdf is available for free (or donation) at <https://leanpub.com/openintro-statistics>.

Most of the “recommended reading” below consists of articles, with links to an online pdf version (e.g., via JSTOR). To access these, you must be on the UR network or have a VPN connection. From time to time, these articles may become ‘required’ reading for homework assignments.

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## Statistical Program: R/RStudio

Students will be required to complete homeworks using the R program for statistical analysis. Many new users find RStudio to be a more user friendly interface. Both R and RStudio are free. You will need to install both on your personal laptop or computer. To do so, you can download them from

- [Comprehensive R Archive Network \(CRAN\)](#). This is the original and most up-to-date version of R. Towards the top of the page is a section titled “Download and Install R.” Select your operating system (Mac, Windows, Linux) and follow the links. Note: I strongly recommend that you install this (i.e., R) before you install RStudio.
- [RStudio](#). This is an integrated environment for R. It contains an editor, console, help, and plot window all in one larger window. Just click on the RStudio link at the beginning of this paragraph. Then select the download for the free RStudio Desktop version.

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## Course Outline

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### 1 Course Introduction

Arrrgh! Why do I have to take this course?!

Required Reading: Agresti, Ch 1.

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## 2 Introduction to R

Folder paths, Installing R & RStudio, Using RStudio

Required Reading: Verzani, Ch 1-2

HW 1: Intro to R

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## 3 Basics of Data Analysis

Variables & Measurement, Sampling & Surveys, Randomization, Descriptive Statistics, Mean, Variance

Required Reading: Agresti, Ch 2–3. Verzani, Ch 3.

Recommended Reading:

- OIS, Ch 2
- Bernard Grofman, William Koetzle, and Anthony McGann. 2002. Congressional Leaders 1965-96: A New Look at the Extremism Versus Centrality Debate. *Legislative Studies Quarterly*. ([JSTOR](#))
- Michael McDonald and Samuel Popkin. 2001. “The Myth of the Vanishing Voter.” *American Political Science Review*, Vol. 95, Issue 4: 963–974. ([JSTOR](#))
- John Woolley. 2000. “Using Media-Based Data in Studies of Politics.” *American Journal of Political Science*, Vol. 44, Issue 1: 156–173. ([JSTOR](#))

HW 2: Variables & Measurement

HW 3: Descriptive Statistics

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## 4 Probability

Probability Basics, Discrete & Continuous Variables, Normal Distribution, Conditional Probability

Required Reading: Agresti, Ch 4.1–4.3.

Recommended Readings:

- OIS, Ch 3-4
- *Law, Probability, and Risk*, Vol. 5, Issue 2 (2006):
  - \* Peter Tillers and Jonathan Gottfried. “Case Comment: *United States v. Copeland*: A Collateral Attack On The Legal Maxim That Proof Beyond A Reasonable Doubt Is Unquantifiable?”

- \* James Franklin. “Quantification Of The ‘Proof Beyond Reasonable Doubt’ Standard.”
- \* Jack Weinstein and Ian Dewsbury. “Comment On The Meaning Of ‘Proof Beyond A Reasonable Doubt’.”

HW 4: Probability

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## 5 Estimation and Inference

Sampling Distributions, Central Limit Theorem, Estimators & Their Properties, Confidence Intervals

Required Reading: Agresti, Ch 4.4–4.7, 5.1–5.4, 5.6. Verzani, Ch 9.

Recommended Reading:

- OIS, Ch 5.1-5.2, 6.1

HW 5: Probability and Sampling Distributions

HW 6: Estimators and Confidence Intervals

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## 6 Hypothesis Tests

Hypothesis Tests, Type I and II Errors

Required Reading: Agresti, Ch 6.1–6.5. Verzani, Ch 10.

Recommended Reading:

- OIS, Ch 5.3, 7.1
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## 7 Comparing Two Groups

Difference of Means, Difference of Proportions

Required Reading: Agresti, Ch 7.1–7.4. Verzani, Ch 11.

Recommended Readings:

- OIS, Ch 6.2, 7.3
- James Payne. 1982. Career Intentions and Electoral Performance of Members of the U. S. House. *Legislative Studies Quarterly*. 7(1):93-99. ([JSTOR](#))

HW 7: Hypothesis Tests & Difference of Means/Proportions

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## 8 Research Design

Types of Research Design, Internal & External Threats to Validity, Experimental Data

Required Reading:

- James McDavid & Laura Hawthorn. 2005. *Research Designs for Program Evaluations*. Chapter 3. ([Sage Proof](#))([Google Books](#))
- Research Methods Knowledge Base, Section on [Design](#)

Recommended Readings:

- Thomas Walker, Lee Epstein and William Dixon. 1988, “On the Mysterious Demise of Consensual Norms in the United States Supreme Court.” *Journal of Politics*, Vol. 50, Issue 2: 361–389. ([JSTOR](#))
- Valeria Hoekstra and Jeffrey Segal. 1996. “The Shepherding of Public Opinion: The Supreme Court and *Lamb’s Chapel*.” *Journal of Politics*, Vol. 58, Issue 4: 1079–1102. ([JSTOR](#))
- Daniel Posner. 2004. “The Political Salience of Cultural Difference: Why Chewas and Tumbukas are Allies in Zambia and Adversaries in Malawi.” *American Political Science Review*, Vol. 98, Issue 4: 529–545. ([JSTOR](#))

HW 8: Research Design

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## 9 Crosstabs & Association

Topics: Cross-Tabulations, Goodness of Fit, Chi-Square Test, Measures of Association

Required Reading: Agresti, Ch 8. Verzani, Ch 12.

Recommended Readings:

- OIS, Ch 6.3-6.4
- Lee Epstein and Charles Hadley. 1990. “On the Treatment of Political Parties in the U.S. Supreme Court, 1900–1986.” *Journal of Politics*, Vol. 52, Issue 2: 413–432. ([JSTOR](#))
- Roy Licklider. 1995. “The Consequences of Negotiated Settlements in Civil Wars, 1945–1993.” *American Political Science Review*, Vol. 89, Issue 3: 681–690. ([JSTOR](#))

HW 9: Crosstabs & Association

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## 10 Correlation and Bivariate Regression

Linear relationships, Correlation, Bivariate Regression, Regression Assumptions

Required Reading: Agresti, Ch 9. Verzani, Ch 13.

Recommended Readings:

- OIS, Ch 8
- W.S. Robinson. 1950. “Ecological Correlations and the Behavior of Individuals.” *American Sociological Review*, Vol. 15, Issue 3: 351–357. ([JSTOR](#))
- Edward Tuft. 1973. “The Relationship Between Seats and Votes in Two-Party Systems.” *American Political Science Review*, Vol. 67, Issue 2: 540–554. ([JSTOR](#))

HW 10: Correlation & Bivariate Regression

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## 11 Multiple Regression

Multiple Regression,  $R^2$ , F-Test, Dummy Variables, Interaction Terms, Quadratic Terms

Required Reading: Agresti, Ch 10, 11.1-11.5, 12.1, 13.1-13.3, 14.1-14.3, 14.5. Verzani, Ch 14.

Recommended Readings:

- OIS, Ch 9
- Mark Duggan. 2001. “More Guns, More Crime.” *Journal of Political Economy*, Vol. 109, Issue 5: 1086–1114. ([JSTOR](#))
- Steven Fish. 2002. “Islam and Authoritarianism.” *World Politics*, Vol. 55, Issue 1: 4–37. ([JSTOR](#))
- Bruce Russett. 1982. “Defense Expenditures and National Well-being.” *American Political Science Review*, Vol. 76, Issue 4: 767–777. ([JSTOR](#))

HW 11: Bivariate & Multiple Regression

HW 12: Multiple Regression, pt II

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## 12 Logistic Regression (if time permits)

Regression with Binary Data, S-curve, Likelihood Ratio Test

Required Reading: Agresti, Ch 15.1-15.3

Recommended Readings:

- OIS, Ch 9.5
- John Oneal and Bruce Russett. 1997. “The Classical Liberals Were Right: Democracy, Interdependence, and Conflict, 1950–1985.” *International Studies Quarterly*, Vol. 41, Issue 2: 267–294. ([JSTOR](#))

HW 13: Logistic Regression

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## 13 Final Exam Review

Final exam review held during lecture the last week of class.

## 14 Final Exam (TBD: Finals Week)

Covers all material to date.

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## Other Important Items

**Course Organization.** The course organization may be adjusted/optimized during the semester according to the pace of learning and the priority of topics. Students are responsible for attending lectures and maintaining an awareness of any changes to the course materials, homework requirements, or exam dates.

**Student Disability Accommodation:** I am happy to work with any student who requires an accommodation due to a disability. It is important that students first contact the Office of Disability Resources. They will discuss any barriers a student is experiencing, explain the process for establishing academic accommodation, and coordinate with me concerning the accommodation. You can reach the Office of Disability Resources at [disability@rochester.edu](mailto:disability@rochester.edu) or (585) 276-5075.

**Academic Honesty.** Students are expected to be familiar with [the University's policies](#) on academic honesty. If I suspect a student has violated the University's academic honesty policies, I am required to initiate the procedures detailed on that webpage. Punchline: don't cheat. If in doubt about what is acceptable behavior concerning completing an exam or homework, please ask me.

In particular (but not limited to):



- All homework and exam answers should be your own work.
- You are not allowed to consult material from previous years of PSC 200, unless the material is specifically provided as review material by the instructor. You are also not allowed to consult online “cheating” sites. However, reading more about a topic in other texts or on other sites (e.g., Wikipedia) is perfectly fine.
- You should not post or share course material (e.g., lectures and homeworks) online without first obtaining the permission of the instructor.

## University COVID-19 Statement

[Note: Since this course will be online, much of the following is irrelevant during online lectures. To the extent that you meet with classmates in person or anyone else outside of class, please follow the University’s guidelines.]

The University is committed to protecting the health and safety of the entire community — students, faculty and staff. For this reason, it is mandatory that everyone wear a mask in University buildings and observe appropriate social distancing, including classrooms. Masks have been provided to students, faculty and staff and classrooms have been specifically assigned to allow for social distancing to support these requirements. You must wear a mask appropriately (e.g. over nose and mouth) if you are attending class in person, and you must do this for every class session and for the entire duration of each class session. If you fail to do this, you will be politely reminded of the requirement and then asked to leave if you do not comply.

If you do not want to wear a mask, you may consider taking the course remotely (online). This may require you to complete a set of online requirements different from the in-person requirements, although these will be equivalent in their learning objectives.

Students who refuse to adhere to requirement for mask wearing or social distancing the course will be in violation of the COVID-19 Community Commitment and will be referred to the Student Conduct system through a COVID-19 Concern Report. Such referrals will lead to student conduct hearings and may result in disciplinary action.

Students who feel unable to wear a mask may contact the Office of Disability Resources to explore options for accommodations. Students requiring accommodations may be asked to participate in the course through synchronous or asynchronous learning as part of this accommodation.

## Attending PSC 200 via Zoom

The online version of class is always a work in progress. However, there are a few things you can do to help it run more smoothly for everyone.

- Find a quiet place to use Zoom. Try to find a spot in your room or home that is quiet, doesn't get interrupted by others, and doesn't have distractions.
- Make sure your audio and video are working. Before you join the class session, take a second to verify that your mic, audio output (e.g., computer speakers or headphones), and video are all working. You can test these by opening the Zoom client settings and clicking on Video and then Audio.
- Join the class a few minutes early to get yourself situated.
- Adjust your volume. This will take some calibration on everyone's part — including mine. I want to hear you, but I also don't want my ears blown out any more than they already are!
- MUTE your audio. In general, unless you are asking or answering a question, mute your own audio. Small background noises can cause the audio and spotlight to jump around.
- START your video. I need to be able to see you during class in order to get feedback from you (e.g., an OK sign or thumbs up), gauge your reactions, call on you, etc. If you are experiencing internet connection issues and Zoom only works reliably with audio, just let me know via email or the Zoom chat function.
- Use the Chat feature while I'm lecturing. If you have a question or want to speak while I'm lecturing, type it in the chat area. I will do my best to get to it promptly. If, for whatever reason, I appear not to have seen it — or forgot about it — copy and paste it back in and raise your hand. If you really, really need to get my attention quickly, unmute your audio and just interrupt me!
- Remember that we can see you. When attending class, please minimize distracting movements. Want to enjoy a cup of coffee or tea? No problem. But maybe hold off on eating that plate of Buffalo wings until after class. And, seriously, we don't need to watch you exercising.

Updated: 8/27/20