

Syllabus
Statistical Methods for Political Research
PLSC 502
Fall 2021
Thursday 9-12, Online

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Course Description: This course introduces you to quantitative tools of data analysis used in political science research. The goals of the class are as follows: First, you will start acquiring the tools necessary to understand and evaluate empirical research. Second, you will learn how to collect, analyze, and interpret data as well as how to present your conclusions. Finally, you will be equipped with the core concepts and theoretical foundations of quantitative analysis that will prepare you for more advanced classes.

Books/Readings: The required book for this course is Walpole, Myers, Myers and Ye (2017). The last few weeks include primary readings from other books, and PDF copies of the relevant chapters will be provided on Canvas. The articles assigned as applications can all be found in the Penn State Library’s electronic journal collection.

Synchronous Component: This course has a weekly synchronous component. The synchronous time will be used to (1) present lectures, (2) review questions about problem sets, (3) answer general questions about the material, and (4) discuss the application readings.

Software: The software for the course is the free and open source R statistical programming software. It is required that all problem sets and analyses reported in the research paper be completed using R .

Online Quizzes: Starting in the second week of the course, there will be two short (four-question) online quizzes (on Canvas) each week, due by 5pm Eastern U.S. time on Wednesday. The first quiz will test the material covered in the previous class sessions. This quiz is intended to evaluate each student's short-term mastery of the material. The second quiz will test the material to be covered in the next class session. This quiz is intended to evaluate each student's independent preparation (e.g., reading, question practice). Quizzes will be graded with a starting grade of 100, and 15 points deducted for each incorrect answer. The student's quiz grade for the week is the highest grade among the two quizzes. In completing the quizzes, students may consult online sources and use R/RStudio, but may not discuss the quizzes with other students in the class. Note, R can be used for computer algebra (e.g., taking analytical derivatives and integrals) via the `Ryacas` package (see <https://www.r-bloggers.com/using-r-as-a-computer-algebra-system-with-ryacas/>).

Application presentations: Each week we will briefly discuss one application paper that makes core use of the concepts covered in the respective week. The application papers are listed in the course schedule below. Each student must give one ten-minute presentation in which they summarize the article and describe the role played by the methods covered in the course in the respective application. Students must sign up for their presentation via SignUpGenius by Monday, 8/30.

Research paper: Students are required to write an original research paper. The final draft is due on 12/16. The following list includes a set of project submission phases with deadlines. If you need an extension for whatever reason, please do not hesitate to ask (ideally, ahead of the deadline).

- **Topic:** The paper can address virtually any topic in which students are interested. There are two constraints. First, the data to be analyzed must be both generated (e.g., an election occurs, a survey is run, a roll call vote is taken) and collected between 11/1 and 12/3. Second, the analysis plan must include running at least one statistical test for association, which can include a t -test, χ^2 test, a test based on bootstrapped confidence intervals, a permutation test, and/or a hypothesis test applied to one or more regression coefficients. The topic of the research project, including a description of the data to be generated and collected, and the association for which the student intends to test, should be written up in a 1–2 page document. This will be due on

9/30.

- **Pre-registration report:** A pre-registration report is a research design prepared with enough detail that the reader knows exactly what the authors will do, and why. Ideally, the pre-registration report will include a complete draft of the final paper excluding the results. Students should submit a first draft that includes an introduction, theory, research design, and plan for analyzing the data collected. The paper may, but does not need to, include analysis of existing data as support for what you think you will find once the data is collected (i.e., pilot data). This will be due on 10/21. Feedback on the first drafts will be provided by 10/25. By 11/1, students should post their revised preregistration reports to their Penn State OneDrive accounts, and send the instructor a link at which the final report can be accessed.
- **Presentation:** Students will deliver ten-minute presentations during the final meeting period of the semester (on 12/9). If, for whatever reason,

Grading:

- Online quizzes: 55%.
- Research paper: 35%.
- Application presentations: 10%.

Grading Scale.

Grade	Lower	Upper
A	93	101
A-	90	93
B+	87	90
B	83	87
B-	80	83
C+	77	80
C	73	77
C-	70	73
D+	67	70
D	63	67
D-	60	63
F	0	60

Course Schedule: The schedule below gives the required reading. The readings listed for a particular date should be read before class time that day. Full citations can be found below in the references section.

Course Introduction

1. 8/26, Course Intro: Syllabus, R/R-Studio, GitHub, OneDrive, and Overleaf
 - Alston and Rick (2021)
 - **Optional:** For a crash course in R, skim and try out Chapters 1–4 of Pearson (2018) (available free through PSU library).
2. 9/2, Overview of Statistics and Data Analysis
 - **Methods:** Chapter 1 of Walpole et al. (2017).
 - **Application:** Grattet and Jenness (2005)
3. 9/9, Introduction to Probability
 - **Methods:** Chapter 2 of Walpole et al. (2017).
 - **Application:** Conley and Kreppel (2001)
4. 9/16, Random variables and distributions
 - **Methods:** Chapter 3 of Walpole et al. (2017).
 - **Application:** Cooper (2001)
5. 9/23, Expectation
 - **Methods:** Chapter 4 of Walpole et al. (2017).
 - **Application:** Persson and Rothstein (2015)
6. 9/30, Important discrete distributions
 - **Methods:** Chapter 5 of Walpole et al. (2017).
 - **Application:** Hill (2001)
7. 10/7, Important continuous distributions
 - **Methods:** Chapter 6 of Walpole et al. (2017).
 - **Application:** Burch (2012)

8. 10/14, Sampling Distributions
 - **Methods:** Chapter 8 of Walpole et al. (2017).
 - **Application:** Koppell and Steen (2004)
9. 10/21, One and Two-sample estimation
 - **Methods:** Chapter 9 of Walpole et al. (2017).
 - **Application:** (Hill, 2013)
10. 10/28, One and Two-sample hypothesis tests
 - **Methods:** Chapter 10 of Walpole et al. (2017).
 - **Application:** Christian, Dillman and Smyth (2007)
11. 11/4, Introduction to regression
 - **Methods:** Chapter 3 of Gelman and Hill (2014)
 - **Application:** Wallsten, Nteta, McCarthy and Tarsi (2017)
12. 11/11, Advanced considerations in regression
 - **Methods:** Chapter 4 of Gelman and Hill (2014)
 - **Application:** Bates and Santerre (2006)
13. 11/18, Bayesian Inference
 - **Methods:** Chapter 18 of Walpole et al. (2017),
 - **Application:** Kernell (2009)
14. 12/2, The Bootstrap and Permutation testing
 - **Methods:** Chapter 14 of Moore and McCabe (2005)
 - **Application:** Chatagnier (2012)
15. 12/9, Project presentations

Masking Regardless of whether Penn State has an indoor masking requirement, and despite being fully vaccinated against COVID-19, Prof. Desmarais will be wearing a mask during in-person office hours throughout the semester. The purpose of doing this is to limit the spread of COVID-19, with special consideration for those of us who live with people who cannot be vaccinated. All students in this class are encouraged to wear a mask during in-person office hours.

Disability Accommodation Statement Penn State welcomes students with disabilities into the University's educational programs. Every Penn State campus has an office for students with disabilities. Student Disability Resources (SDR) website provides contact information for every Penn State campus (<http://equity.psu.edu/sdr/disability-coordinator>). For further information, please visit Student Disability Resources website (<http://equity.psu.edu/sdr/>).

In order to receive consideration for reasonable accommodations, you must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: See documentation guidelines (<http://equity.psu.edu/sdr/guidelines>). If the documentation supports your request for reasonable accommodations, your campus disability services office will provide you with an accommodation letter. Please share this letter with your instructors and discuss the accommodations with them as early as possible. You must follow this process for every semester that you request accommodations.

Academic Integrity Statement Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment by all members of the University community not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.

Counseling and Psychological Services Statement Many students at Penn State face personal challenges or have psychological needs that may interfere with their academic progress, social development, or emotional wellbeing. The university offers a variety of

confidential services to help you through difficult times, including individual and group counseling, crisis intervention, consultations, online chats, and mental health screenings. These services are provided by staff who welcome all students and embrace a philosophy respectful of clients' cultural and religious backgrounds, and sensitive to differences in race, ability, gender identity and sexual orientation.

Counseling and Psychological Services at University Park (CAPS)
(<http://studentaffairs.psu.edu/counseling/>): 814-863-0395

Counseling and Psychological Services at Commonwealth Campuses
(<http://senate.psu.edu/faculty/counseling-services-at-commonwealth-campuses/>)

Penn State Crisis Line (24 hours/7 days/week): 877-229-6400 Crisis Text Line (24 hours/7 days/week): Text LIONS to 741741

Educational Equity/Report Bias Statements Consistent with University Policy AD29, students who believe they have experienced or observed a hate crime, an act of intolerance, discrimination, or harassment that occurs at Penn State are urged to report these incidents as outlined on the University's Report Bias webpage (<http://equity.psu.edu/reportbias/>)

References

- Alston, Jesse M and Jessica A Rick. 2021. "A Beginner's Guide to Conducting Reproducible Research." *Bulletin of the Ecological Society of America* 102(2):1-14.
- Bates, Laurie J and Rexford E Santerre. 2006. "Leviathan in the Crosshairs." *Public Choice* 127(1-2):133-145.
- Burch, Traci. 2012. "Did disfranchisement laws help elect President Bush? New evidence on the turnout rates and candidate preferences of Florida's ex-felons." *Political Behavior* 34(1):1-26.
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- Cooper, Alexandra L. 2001. "Nonnminating Presidential Candidates: The Primary Season Compared to Two Alternatives." *Political Research Quarterly* 54(4):771–793.
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- Grattet, Ryken and Valerie Jenness. 2005. "The reconstitution of law in local settings: Agency discretion, ambiguity, and a surplus of law in the policing of hate crime." *Law & Society Review* 39(4):893–942.
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- Pearson, R.K. 2018. *Exploratory Data Analysis Using R*. Chapman & Hall/CRC Data Mining and Knowledge Discovery Series CRC Press.
URL: <https://books.google.com/books?id=-UlaDwAAQBAJ>
- Persson, Anna and Bo Rothstein. 2015. "It's my money: Why big government may be good government." *Comparative Politics* 47(2):231–249.
- Wallsten, Kevin, Tatishe M Nteta, Lauren A McCarthy and Melinda R Tarsi. 2017. "Prejudice or principled conservatism? Racial resentment and white opinion toward paying college athletes." *Political Research Quarterly* 70(1):209–222.
- Walpole, R.E., R.H. Myers, S.L. Myers and K. Ye. 2017. *Probability and Statistics for Engineers and Scientists*. Pearson.
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