

Statistical Methods for Political Research
PLSC 502
Pond Lab 236
Tuesday and Thursday 1:00-2:30pm

Instructor Information

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Office Hours: Wednesday 3:00-5:00 and Thursday 2:30-3:30

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.

Teaching Assistant

Wonjun Song
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Pond Lab 214
Office Hours: Mondays 11:00-1:00

Textbook

The following textbook is required reading for the class.

Alan Agresti and Barbara Finlay. 2009. *Statistical Methods for the Social Sciences*. Fourth Edition. Upper Saddle River, NJ: Prentice Hall.

The textbook presents the material in an accessible language. Please read the assigned sections before the class. Below is a list of other books written in more technical language that would help prepare you for more advanced classes.

Morris H. DeGroot and Mark J. Schervish. 2012. *Probability and Statistics*. Fourth Edition.

John Fox. 2016. *Applied Regression Analysis and Generalized Linear Models*. Third Edition.

Edward Greenberg. 2012. *Introduction to Bayesian Econometrics* Cambridge University Press, Second Edition.

Jan Kmenta. 1986. *Elements of Econometrics* University of Michigan.

David A. Freedman. 2005. *Statistical Models. Theory and Practice* Cambridge University Press.

William H. Greene. 2002. *Econometric Analysis* Prentice Hall, Fifth Edition.

Software

We are going to use the statistical environment **R** to display and to analyze data in this course. **R** is free. You can download the software and the manuals at <https://www.r-project.org/> **RStudio** is a tool that facilitates using **R**. It is available at <https://www.rstudio.com/>

Requirements and Evaluation

Attendance

There is no grade for attendance; however, I expect you to attend all classes. If you miss a class, you are responsible for going over the lecture material and asking me any questions you may have.

Problem Sets - 60 points

There will be 12 problem sets during the semester – each worth 5 points. Answers have to be typed, and clearly presented. I recommend that you use LaTeX to typeset your answers. Paper copies of problem sets will be due at the *beginning* of the class on the dates listed below. If you have issues regarding the printer or if you cannot attend that day’s class, please e-mail the pdf file to me and the teaching assistant *before* the class starts. Any submission after the class will lose 1 point. No assignments will be accepted after the day the assignment is due. You can collaborate on problem sets; however, each student is expected to write his/her own answers.

Midterm Exam - 20 points

The midterm exam is on October 19th during class time. The exam will be “closed book” and it will cover the material discussed until that day. You will be allowed to bring one sheet of paper with your notes. Make-up exams will only be given in cases of health or family emergencies.

Final Exam - 20 points

The final exam is during the exam week – December 11-15. The exam will be “closed book” and it will cover all the material discussed during the course. You will be allowed to bring one sheet of paper with your notes. Make-up exams will only be given in cases of schedule conflicts, health or family emergencies.

Grading scale

Score	Grade	Score	Grade	Score	Grade	Score	Grade
≥ 94	A	≥ 83	B	≥ 73	C	≥ 63	D
≥ 90	A-	≥ 80	B-	≥ 70	C-	≥ 60	D-
≥ 87	B+	≥ 77	C+	≥ 67	D+	< 60	Fail

Tentative Schedule

August 22 Course Overview

August 24 Introduction and R

Required: Agresti and Finlay, Chapter 1

August 29 Sampling and Measurement

Required: Agresti and Finlay, Chapter 2

August 31 Descriptive Statistics

Required: Agresti and Finlay, Chapter 3

September 5 Data Display

Required: Fox, Chapter 3

Problem Set 1 due

September 7 Introduction to Probability

Required: Agresti and Finlay, Chapter 4.1

Recommended: De Groot and Schervish, Chapters 1-2

September 12 Probability Distributions

Required: Agresti and Finlay, Chapter 4.2-4.3

Recommended: De Groot and Schervish Chapter 3.1-3.9

Problem Set 2 due

September 14 Probability Distributions

Required: Agresti and Finlay, Chapter 4.2-4.3

Recommended: De Groot and Schervish Chapter 4.1-4.3, 5.6

September 19 Sampling Distribution

Required: Agresti and Finlay, Chapter 4.4

Recommended: De Groot and Schervish Chapter 8.1

Problem Set 3 due

September 21 Central Limit Theorem

Required: Agresti and Finlay, Chapter 4.5-4.6

Recommended: De Groot and Schervish Chapter 6.1-6.3

September 26 Estimation and Estimators

Required: Agresti and Finlay, Chapter 5.1

Recommended: De Groot and Schervish Chapter 7.1, 7.5, 8.7

Problem Set 4 due

September 28 Confidence Intervals

Required: Agresti and Finlay, Chapter 5.2-5.3

Recommended: De Groot and Schervish 8.5

October 3 Hypothesis Testing

Required: Agresti and Finlay, Chapter 6.1-6.3

Recommended: De Groot and Schervish 9.1-9.2, 9.4, 9.9

Problem Set 5 due

October 5 Hypothesis Testing

Required: Agresti and Finlay, Chapter 6.4-6.8

Recommended: Jeff Gill. 1999. "Insignificance of Null Hypothesis Significance Testing", *Political Research Quarterly* 52(3):647-674.

October 10 Comparing Two Groups

Required: Agresti and Finlay, Chapter 7

Recommended: De Groot and Schervish 9.6

Problem Set 6 due

October 12 Contingency Tables

Required: Agresti and Finlay, Chapter 8.1-8.4

Recommended: De Groot and Schervish Chapter 10.3

October 17 Review

October 19 Midterm Exam

October 24 Bivariate Regression

Required: Agresti and Finlay, Chapter 9.1-9.2

Recommended: Fox, Chapter 5.1

Problem Set 7 due

October 26 Bivariate Regression

Required: Agresti and Finlay, Chapter 9.3-9.4

October 31 Bivariate Regression

Required: Agresti and Finlay, Chapter 9.5

Recommended: Fox, Chapter 6.1

Problem Set 8 due

November 2 Multivariate Regression

Required: Agresti and Finlay, Chapter 10, 11.1-11.4

Recommended: Fox, Chapter 5.2, 6.2

November 7 Interaction and Dummies

Required: Agresti and Finlay, Chapter 11.5, 13.1-13.4

Recommended: Fox, Chapter 7. Thomas Brambor, William R. Clark and Matt Golder. 2006. "Understanding Interaction Models: Improving Empirical Analyses", *Political Analysis* 14: 63-82.

Problem Set 9 due

November 9 Influential Observations

Required: Agresti and Finlay, Chapter 9.6

Recommended: Fox, Chapter 11

November 14 Regression Diagnostics

Required: Agresti and Finlay, Chapter 14.2

Recommended: Fox, Chapter 12.1-12.4

Problem Set 10 due

November 16 Regression Diagnostics

Required: Agresti and Finlay, Chapter 14.3

Recommended: Fox, Chapter 13

November 21 and 23 Thanksgiving

November 28 Regression Diagnostics

Problem Set 11 due

November 30 Introduction to Bayesian Inference

Required: Greenberg Chapter 2

December 5 Introduction to Bayesian Inference

Required: Greenberg Chapter 3

Problem Set 12 due

Academic Integrity

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.

Disability Accommodation

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.

Counseling and Psychological Services

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

Penn State University has adopted a “[Protocol for Responding to Bias Motivated Incidents](#)” that is grounded in the policy that the “University is committed to creating an educational environment which is free from intolerance directed toward individuals or groups and strives to create and maintain an environment that fosters respect for others.” That policy is embedded within an institution traditionally committed to [academic freedom](#). Bias motivated incidents include conduct that is defined in [University Policy AD 91: Discrimination and Harassment, and Related Inappropriate Conduct](#). Students, faculty, or staff who experience or witness a possible bias motivated incident are urged to report the incident immediately by doing one of the following:

* Submit a report via the Report Bias webpage <http://equity.psu.edu/reportbias/>

* Contact one of the following offices:

University Police Services, University Park: 814-863-1111

Multicultural Resource Center, Diversity Advocate for Students: 814-865-1773

Office of the Vice Provost for Educational Equity: 814-865-5906

Office of the Vice President for Student Affairs: 814-865-0909

Affirmative Action Office: 814-863-0471

* Dialing 911 in cases where physical injury has occurred or is imminent