

**Quantitative Empirical Methods of Political Science – PS 300**  
**Department of Political Science - University of Michigan**  
**Winter 2017**

UPDATED: JANUARY 10, 2017

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<b>Instructor's Office:</b>	6640 Haven Hall
<b>Class Location:</b>	1427 Mason Hall
<b>Class Time:</b>	Tue-Thu 4:00-5:30 PM
<b>Instructor's Office Hours:</b>	Monday 3:15-5:00pm
<b>GSI:</b>	Roya Talibova < <a href="mailto:talibova@umich.edu">talibova@umich.edu</a> >
<b>Discussion Sections:</b>	Mon 3-4 G449 Mason Hall; or Mon 4-5 2437 Mason Hall; or Wed 3-4 3451 Mason Hall
<b>GSI's Office Hours:</b>	TBA

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**Note:** The drop/add deadline for Winter 2017 is Tuesday, January 24th. Students may drop and add classes until 11:59pm on this day without transcript or tuition penalty.

## Course Overview

This course offers an introduction to the methods political scientists use to construct hypotheses about political phenomena, and to evaluate those hypotheses empirically. The emphasis will be on programming, hands-on empirical analysis, and conceptual discussion of the role of research designs—the strategy that allows researchers to justify the assumptions that are needed to test hypotheses using empirical data. The class will be heavily applied, with lots of empirical examples. We will introduce and discuss a lot of statistical concepts, and all students will learn how to program in the statistical software R. No background in programming or statistics is required; but all students are expected to have basic knowledge and ability in basic statistics and basic programming by the end of the semester.

## University, College, Department and Course Statements

**Accommodations for Students with Disabilities.** If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the *Services for Students with Disabilities (SSD)* office to help us determine appropriate academic accommodations. SSD (734-763-3000; <http://ssd.umich.edu>) typically recommends accommodations through a *Verified Individualized Services and Accommodations (VISA)* form. Any information you provide is private and confidential and will be treated as such.

**Religious and Academic Conflicts.** Although the University of Michigan, as an institution, does not observe religious holidays, it has long been the University's policy that every reasonable effort should be made to help students avoid negative academic consequences when their religious obligations conflict with academic requirements. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the period of absence. Students who expect to miss classes, examinations, or other assignments as a consequence of their religious observance shall be provided with a reasonable alternative opportunity to complete such academic responsibilities. It is the obligation of students to provide faculty with reasonable notice of the dates of religious holidays on which they will be absent. Such notice must be given by the drop/add deadline of the given term. Students who are absent on days of examinations or class assignments shall be offered an opportunity to make up the work, without penalty, unless it can be demonstrated that a make-up opportunity would interfere unreasonably with the delivery of the course. Should disagreement arise over any aspect of this policy, the parties involved should contact the Director of Graduate or Undergraduate Studies. Final appeals will be resolved by the Provost.

**Students Representing the University of Michigan.** There may be instances when students must miss class due to their commitment to officially represent the University. These students may be involved in the performing arts, scientific or artistic endeavors, or intercollegiate athletics. Absence from classes while representing the University does not relieve students from responsibility for any part of the course missed during the period of absence. Students should provide reasonable notice for dates of anticipated absences and submit an **individualized class excuse form**.

**Student Mental Health and Wellbeing.** The University of Michigan is committed to advancing the mental health and wellbeing of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of support, services are available. For help, contact *Counseling and Psychological Services (CAPS)* at (734) 764-8312 and <https://caps.umich.edu/> during and after hours, on weekends and holidays, or through its counselors physically located in schools on both North and Central Campus. You may also consult *University Health Service (UHS)* at (734) 764-8320 and <https://www.uhs.umich.edu/mentalhealthsvcs>, or for alcohol or drug concerns, see [www.uhs.umich.edu/aodresources](http://www.uhs.umich.edu/aodresources). For a listing of other mental health resources available on and off campus, visit: [http:](http://)

[//umich.edu/health-medicine](http://umich.edu/health-medicine) and <http://umich.edu/~mhealth>.

**Academic Integrity.** The LSA academic community, like all communities, functions best when its members treat one another with honesty, fairness, respect, and trust. The College holds all members of its community to high standards of scholarship and integrity. To accomplish its mission of providing an optimal educational environment and developing leaders of society, the College promotes the assumption of personal responsibility and integrity and prohibits all forms of academic dishonesty and misconduct. Academic dishonesty may be understood as any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. Conduct, without regard to motive, that violates the academic integrity and ethical standards of the College community cannot be tolerated. The College seeks vigorously to achieve compliance with its community standards of academic integrity. Violations of the standards will not be tolerated and will result in serious consequences and disciplinary action. See [examples of academic misconduct](#).

**Civil and respectful exchange of ideas.** In this class, we will engage with a variety of theoretical and methodological approaches. It is almost certain that you will read or hear something with which you do not agree. In all cases, please remember to engage in respectful, civil discourse with your colleagues. You are expected to keep an open mind, listen attentively to one another's views, and even to question your own prior assumptions. If you have any questions about this policy or if any concerns arise over the course of the semester, please get in touch with the professor or GSI.

**Grade Grievances.** If you believe a grade you have received is unfair or in error, you will need to do the following:

1. Wait 24 hours after receiving the grade before approaching your instructor.
2. Provide an explanation **in writing** for why the grade you received was unfair or in error.
3. If you believe the instructor's response fails to address your claim of unfairness or error, you may petition the department's Director of Undergraduate Studies at the latest **within the first five weeks of classes following the completion of the course**. You must **convey in writing the basis for the complaint**, with specific evidence in support of the argument that the grade either was given in error or was unfairly determined. This formal complaint also should summarize the outcome of the initial inquiry to the course instructor, indicating which aspects are in dispute. Within three weeks of the receipt of the petition, the DUS will determine whether to convene the Undergraduate Affairs Committee, the student, and the instructor(s) for a formal hearing. Further details on this process are included on the department website under [Advising > Contesting a Grade](#).

## Requirements.

1. **Problem sets.** There will be nine (roughly weekly) problem sets. The problem sets will contain a combination of programming, analytical, conceptual, and data analysis questions.
2. **Midterm exams.** There will be two midterm exams: one in-class midterm exam, and one take-home midterm exam. The first midterm exam is in-class, on Tuesday February 21; you must bring a blue book to class on this date. The second midterm exam is take-home, starting on Thursday, April 6 and ending on Monday April 10; submission of the second midterm exam must be done electronically on the class' Canvas website.

**Software.** The course will use the statistical software R (see <http://cran.r-project.org> for excellent online documentation, manuals, and resources). All students are expected to learn R and use it to solve the problem sets. We will teach how to use R in both the lecture and the discussion section.

**Class participation.** Participation in class is essential. Your participation in the lecture and, in particular, in the discussion section (asking questions, answering questions, offering comments, etc.) is what makes the class interesting and engaging. There is a bonus grade of 10% at the end of the semester based on class participation throughout the semester. This means that you can increase your final grade by as much as 10% if you participate in class. To earn the full 10%, you must participate in a constructive and sustained way during the entire semester. This means that participating intensely during a class or two will not translate into bonus points. The best way to ensure class participation is to come to class prepared, having done all the readings in advance.

**Grading Policy.** The final grade will be determined by the problem sets (40%), in-class midterm exam (30%) and take-home midterm exam (30%). A bonus 10% of grade will be given to those students who display a sustained level of engaged class participation throughout the semester, as explained above. Note that this 10% is in addition to the 100% determined by problem sets and midterms; this ensures that students who are uncomfortable participating in class for personal reasons can still get 100% of the grade (i.e., participation is not a necessary condition to obtain an A as final grade in the course).

**Incomplete policy.** No incompletes will be given.

## Books

The course will mostly rely on the following two books:

- Imai, Kosuke. (2017). *Quantitative Social Science: An Introduction*. Princeton University Press, Forthcoming. [Note: This book is not available yet; the forthcoming manuscript will be on Canvas. **The electronic manuscript cannot be shared with anyone outside of the class.**]

- Freedman, David, Robert Pisani and Roger Purves. (2007). *Statistics*. W. W. Norton & Company, 4th edition.
- Stock, James H. and Mark W. Watson. (2007). *Introduction to Econometrics*. Pearson, 2nd Edition. [Note: There is a new edition of this book from 2015. It's called the Update, 3rd Edition. Page numbers below refer to the **2nd** edition, but you can find the same topics in the Update 3rd edition as well.]

In addition, we will use the following book as reference for some of the topics:

- Kellstedt, Paul and Guy D. Whitten. (2013). *The Fundamentals of Political Science Research*, 2nd ed., Cambridge University Press.

## Outline of classes and readings

### Part I: Basic tools for statistical analysis

#### 1. Basic probability concepts and descriptive data analysis

- Random variables, probability distributions, samples and populations.
  - Stock and Watson, Chapter 2 pp. 17-23.
- Univariate analysis: means, medians, variances and histograms.
  - Freedman, Pisani and Purves, Chapter 3-4.
  - Stock and Watson, Chapter 2 pp. 23-29.
  - Imai, Chapter 6, pp. 261-323.
- Bivariate analysis: scatterplots, crosstabs, covariance and correlations.
  - Freedman, Pisani and Purves, Chapters 8-9.
  - Stock and Watson, Chapter 2 pp.34-35, Chapter 3, pages 92-96
  - Imai, Chapter 3, pp. 106-124.

#### 2. Statistical inference

- The law of large numbers and the central limit theorem.
  - Freedman, Pisani and Purves, Chapters 5 and 18
  - Stock and Watson, Chapter 2 pp 45-57

- Imai, Chapter 6, pp. 323-334.
- Estimation, hypothesis testing and confidence intervals for the population mean.
  - Freedman, Pisani and Purves, Chapter 26
  - Stock and Watson, Chapter 3 pp 65-83
  - Imai, Chapter 7, 339-400.
- Comparing means from different populations.
  - Freedman, Pisani and Purves, Chapter 27
  - Stock and Watson Chapter 3 pp. 83-92.

### 3. Linear regression model

- Linear regression model.
  - Freedman, Pisani and Purves, Chapter 10-12
  - Stock and Watson Chapters 4-7
  - Imai, Chapter 7, pp. 400-422.
- Graphical interpretation.
  - Stock and Watson Chapter 4
  - Freedman, Pisani and Purves, Chapter 12.
- Using linear regression to compare means from different populations.

<p><b>First Midterm exam (in class): Tuesday Feb 21st</b></p>
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## Part II: Causation as manipulation, the role of research design, and additional topics in empirical analysis

### 4. Potential outcomes, causation and manipulation

The connection between causation and manipulation.

- Holland, Paul W., 1986. “Statistics and Causal Inference” (with discussion), *Journal of the American Statistical Association*, 81(396):945-970.
- Freedman, Pisani and Purves, Chapters 1-2.

## 5. Experiments vs. Observational Studies

Experiments vs. observational studies. The role of research design in observational studies.

- Freedman, David, 1999. “From association to causation: some remarks on the history of statistics”, *Statistical science*, 14(3).
- Freedman, David, 1991. “Statistical Models and Shoe Leather”, *Sociological Methodology*, 21:291-313.
- Freedman, David, 2008. “On Types of Scientific Inquiry: The Role of Qualitative Reasoning”, in *The Oxford Handbook of Political Methodology*. Janet Box-Steffensmeier, Henry Brady, and David Collier, eds. Oxford: Oxford University Press, pp. 300-318.

Freedman, David, 1997. “From Association to Causation via Regression”, *Advances in Applied Mathematics*, 18(1):59-110.

- Imai, 2017. Chapter 2.

John Snow’s natural experiment:

- Johnson, Steven. “The Ghost Map: The Story of London’s Most Terrifying Epidemic—And How it Changed Science, Cities, and the Modern World”. Penguin, 2006.
- Imai, 2017. Chapter 5, pp. 236-260.

## 6. Measurement

Measurement. Surveys and survey sampling. The role of random sampling. Measuring latent variables.

- Imai, 2017. Chapter 3.

## 7. Text as Data

- Imai, 2017. Chapter 5.

# Part III: Non-experimental Research Designs in Political Science

## 8. Regression Discontinuity

- Thistlethwaite, Donald L.; Campbell, Donald T, 1960. “Regression-discontinuity analysis: An alternative to the ex post facto experiment”. *Journal of Educational Psychology*, 51(6):309-317.

- Cattaneo, Matias D., Brigham R. Frandsen, and Rocío Titiunik. “Randomization inference in the regression discontinuity design: An application to party advantages in the US Senate.” *Journal of Causal Inference* 3.1 (2015): 1-24.

Lee, David S., 2008. “Randomized Experiments from Non-random Selection in U.S. House Elections.”. *Journal of Econometrics*, 142(2):675-697.

Caughey, Devin, and Jasjeet S. Sekhon, 2011. “Elections and the Regression Discontinuity Design: Lessons from Close US House Races, 1942–2008.”. *Political Analysis*, 19(4): 385-408.

## 9. Matching

- Lyall, Jason, 2010. “Are Coethnics More Effective Counterinsurgents? Evidence from the Second Chechen War”. *The American Political Science Review*, 104(1):1-20.
- Gordon, Sanford C. and Gregory A. Huber, 2007. “The effect of electoral competitiveness on incumbent behavior”. *Quarterly Journal of Political Science*, 2:107-138.

## 10. Comparisons over time

- Edward R. Tufte, 1975.”Determinants of Outcomes of Midterm Congressional Elections”. *American Political Science Review*, 69(3):812-826.
- Erikson, Robert S., 1989. “The Puzzle of Midterm Loss”. *The Journal of Politics*, 50(4):1011-1029.
- “Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania.” *American Economic Review*, Vol. 84, No. 4, pp. 772-793.
- Imai (2017), Chapter 2, pp. 59-68.

<p><b>Second midterm exam (take-home): Thu Apr 6 through Mon Apr 10</b></p>
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Table 1: Schedule of classes and important assignments

Week	Date	Important event
Week 1	Jan 5	
Week 2	Jan 10 - Jan 12	
Week 3	Jan 17 - Jan 19	Problem Set 1 due 1/19
Week 4	Jan 24 - Jan 26	Problem Set 2 due 1/26
Week 5	Jan 31 - Feb 2	Problem Set 3 due 2/2
Week 6	Feb 7 - Feb 9	Problem Set 4 due 2/9
Week 7	Feb 14 - Feb 16	Problem Set 5 due 2/16
Week 8	Feb 21 - Feb 23	First midterm exam (in-class) on Tuesday Feb 21
Week 9	Feb 28 - Mar 2	Winter break, no class this week
Week 10	Mar 7 - Mar 9	
Week 11	Mar 14 - Mar 16	Problem Set 6 due 3/16
Week 12	Mar 21 - Mar 23	Problem Set 7 due 3/23
Week 13	Mar 28 - Mar 30	Problem Set 8 due 3/30
Week 14	Apr 4 - Apr 6	Problem Set 9 due 4/6
Week 15	Apr 11 - Apr 13	Second midterm exam (take-home): Thu Apr 6 through Mon Apr 10
Week 16	Apr 18	Last day of classes