Quantitative Political Methodology
L32 Pol Sci 363

Course description

How do social scientists produce 'positive' knowledge (that is, concerning causes and effects)? Such knowledge is often critical to help inform policy. Examples abound. What explains differences in student achievement? Does government regulation of pharmaceutical companies benefit or harm the public? What is the best way to allocate limited resources to control the spread of AIDS? Are female-led governments less corrupt? These are examples of questions that can be, and have been, addressed by social scientists. The focus of this course is to understand how we create *positive* knowledge.

Many questions of great interest and impact, of course, are difficult to answer with full certainty. We will explore some of the reasons for this. Yet, this is not to say that nothing can be learned from their systematic study. We will study the process of determining cause and effect. We will do this by learning the appropriate tools necessary to analyze different kinds of social science data.

There are three components to the course. First, we will study some of the technical aspects of the analysis of data. Second, we will read existing social science research for its substantive content as well as its use of data analysis. Third, the course includes a hands-on component, where you will analyze data yourself. These three components inform each other, therefore they will not be neatly separated, but rather they will overlap both in class and in your work.

The course is separated into distinct units, where each unit focuses on asking and answering a specific social science question. In order to provide an answer to that question you will learn a number of statistical tools. These tools are both theoretical and practical – that is, some will involve mathematical equations while others will involve analyzing data on your computer. This is an ambitious and demanding course, covering a lot of material. The material is cumulative and it is best learned through application. Therefore, it is important that you stay on top of the readings and the assignments.

QPM is the only required course for a major in political science. As such, throughout the course we will foreshadow material that is covered in greater depth in other political science courses. All material will be presented in a way that is accessible to a general audience with or without a strong technical background. This course is designed for students of all levels and is taught accordingly. There are ample opportunities for those with stronger quantitative skills or interests to extend the topics we examine, particularly through completion of the final research project.

Learning objectives

By the end of this course, you should be able to:

- Present data using graphics and descriptive statistics in a clear and informative manner

- Apply basic concepts from probability theory to social science research questions

- Describe the threats to making causal inferences from observational data and identify how they could change the conclusions of a study

- Make inferences about the distribution of populations based on a sample

- Correctly conduct and interpret hypothesis tests

- Understand linear regression in theory and practice (i.e., be able to read and interpret regression tables in academic articles)

- Interpret social science research

- Think carefully about research design

- Work collaboratively with other students to complete problem sets that apply concepts from class readings and short lectures

- Gather, analyze, interpret, and present your own data

Locations and Times

LECTURE	LABS
Tuesday and Thursday	Friday
9:00 AM – 10:00 AM	Time Varies Based On Assigned Section
Seigle Hall 304	EADS 014

Course attendance and laboratory section attendance are both critical and consequently mandatory for all enrolled students. We will record laboratory section attendance and more than two absences will result in a penalized class participation grade.

Course Personnel

Instructor:
Betsy Sinclair
Associate Professor, Department of Political Science
Office: Seigle 235
E-mail: bsinclai@wustl.edu
Course e-mail: qpmwashu@gmail.com
Office Hours: Tuesday 3:30-4:30 PM and by appointment

Teaching Assistants:

Graduate TAs	Undergraduate TAs
David Carlson	Matt Bolin
Email: carlson.david@wustl.edu	Email: mtbolin@wustl.edu
Office Hours: 1-2 PM Thursday	Tia Caldwell
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Adrián Lucardi	Chandler Elliott-Fehle
Email: adrianlucardi@wustl.edu	Email: elliott-fehlecr@wustl.edu
Office Hours: 11 AM - noon Tuesday	Gina Eum
Office Hours Location: Seigle 255	Email: gina.eum@wustl.edu
Dino Hadzic	Scott Jacobs
Email: dino.hadzic@wustl.edu	Email: scottjacobs@wustl.edu
Office Hours: 10 - 11 AM Wednesday	Hunter Malasky
Office Hours Location: Seigle 276	Email: hmalasky@wustl.edu

Please use the course email (qpmwashu@gmail.com) for all substantive questions. All of us will check this email address regularly. This will ensure that we can reply to your questions as soon as possible. If you ask a question of general interest we may reply to all students in this course. If you have a personal question you should feel free to email me directly.

Each laboratory session will be led by one of the graduate teaching assistants and several of the undergraduate teaching assistants. Most grading will be done by the graduate TAs; some will be done by Professor Sinclair. The graduate teaching assistants will work closely in conjunction with Professor Sinclair on all issues of grading.

Textbooks

All of the books below are available via Amazon. Many of the resources for this class will also be available online, for free.

Required:

Angrist, Joshua D. and Jorn-Steffen Pischke. 2015. *Mastering 'Metrics*. Princeton, New Jersey: Princeton University Press.

Wheelan, Charles. 2013. *Naked Statistics*. New York, New York: W. W. Norton and Company.

Free:

Statistical Reasoning. Online tutorial provided by the Open Learning Initiative at Carnegie Mellon. More information here.

Online Statistics Education: An Interactive Multimedia Course of Study. Free online textbook. More information here.

OpenIntro Statistics 2nd Edition. Free online textbook. More information here.

Suggested For Extra Help:

Gill, Jeff. 2006. *Essential Mathematics for Political and Social Research.* Cambridge, England: Cambridge University Press.

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

Gonick, Larry and Woollcott Smith. 1992. *The Cartoon Guide to Statistics*. Harper-Collins Publishers.

For Extra Credit:

Each student may earn up to .5% extra credit by authoring a three page response paper to the books below. These responses are due at the same time as each of the six homework assignments. When writing, please respond to the prompt, "What components of this book build positive knowledge through research design and empirical analysis? What are potential strengths and weaknesses of this approach and analysis?"

1. Sinclair, Betsy. 2012. *The Social Citizen*. Chicago: University of Chicago Press. (HW 1)

2. Lewis, Michael. 2004. *Moneyball*. New York: W. W. Norton and Company. (HW 2)

3. Green, Donald. P. and Alan S. Gerber. 2008. *Get Out the Vote: How to Increase Voter Turnout.* 2nd Edition. Brookings Institution Press. (HW 3)

4. Issenberg, Sasha. 2013. *The Victory Lab: The Secret Science of Winning Campaigns.* Broadway Books. (HW 4)

5. Levitt, Steven D. and Stephen J. Dubner. 2009. *Freakonomics: A Rogue Economist Explores the Hidden Side of Everything.* Harper Perennial. (HW 5)

6. Kahneman, Daniel. 2013. *Thinking, Fast and Slow.* Farrar, Straus and Firoux. (HW 6)

Software

You will be using the R statistical package which you will access via RStudio. This package is widely used in political science, economics, psychology, sociology, and biostatistics. R is available for every computing platform, and most importantly, is free. *Please bring your laptops to the first lab session for help installing the program and to each class session unless otherwise indicated.*

Team-based learning

This course will feature as little traditional lecturing as possible. Students will be expected to learn the basic content of the readings before class so that the majority of class time can be dedicated to discussion, group work, and hands-on demonstrations, which are more likely to facilitate successful learning. We will work in teams throughout the semester to maximize active engagement with the course material. By working in teams, students will not only develop communication and collaboration skills but assist each other in understanding and applying concepts successfully. Early in the semester, you will be assigned to a team of five or six students. You will work with this team throughout the semester on in-class assignments, homework, and final research projects. To ensure that each student contributes the group's success, your contributions will be assessed via the self- and peer-evaluation components discussed below.

Requirements and Evaluation

Grading in this class will be based on the components described below. **Late work will not be accepted without prior permission**. Makeup exams will not be given, and students who miss exams will receive a score of 0 absent extraordinary circumstances.

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

Peer assessments - 10%

Early in the semester, you will be assigned into a team of 5-6 individuals. You will work with this team throughout the semester on assignments and your final research project. To help ensure that all members of the team are actively contributing, students will be asked to evaluate their teammates' contributions, effort, and performance. You will receive ungraded midterm evaluations from your group to help you know how well you are doing and identify areas in need of improvement. You will also complete a midterm self-evaluation of your own contributions, effort, and performance using an identical form to help you reflect on your own effort and performance. (All peer and self-evaluation forms are provided at the end of the syllabus.)

Problem sets, in-class work, and quizzes - 20%

Problem sets, or homeworks, will be distributed throughout the course (10%). These are group assignments – you may ask your colleagues for help – and you will turn them in as a research team and receive a single grade. Please turn them in on the specified date **at the beginning of class** with all group member names provided. If you have a printing problem, you are responsible for emailing it to your graduate TA before class starts.

Individual preparedness assessments (IPAs) are open book quizzes that will be administered on Blackboard before each class (5%). They become available at least 24 hours before they are due and are available until 15 minutes before the next class begins. These are designed to ensure that students arrive to class prepared to engage in discussion and team activities based on the assigned reading. (Many in-class team activities will be graded, so these assessments are necessary to ensure that all members are ready to contribute.) You should complete these assessments yourself with no assistance from your colleagues; you may not discuss them with other students prior to class. Each student's two lowest IPA grades will be dropped in final grade calculations. No additional waivers will be granted.

    Note: IPAs will be set to become available on Blackboard 24 hours before they are due and remain available until 15 minutes before the beginning of the class whose content they cover. Each IPA is five minutes long and consists of up to five multiple-choice or multiple-answer questions. You must complete them in one sitting after doing the reading; they may not be paused or retaken and they will automatically be submitted when the time limit expires.

In-class assignments will be completed during class with your research team (5%). These will vary as to whether they are group-level or individual-level assignments. **All absent students will receive a zero**. Students missing more than five minutes of class time will be counted as absent. Each student's two lowest in-class assignment grades will be dropped in the final grade calculations. No additional waivers will be granted.

Midterm exam - 20%

The midterm exam will be held in class on 10/22 and will cover the material discussed in class up to that point. No calculators are permitted.

Participation – 5%

Attendance in laboratory sessions is mandatory. More than two absences will result in a zero participation grade.

Research project - 20%

Working with your assigned team, students will select a social science research question of interest, collect data, and conduct a quantitative analysis of their results. These findings will be written up and presented as scientific posters during the final class period. Each group should submit a Powerpoint or PDF file of their poster and replication data/annotated R code generating your results *before the final lecture period on 12/1.*[1] Note that the teams receiving the best poster grades are inevitably those that start early and ask for feedback. The best poster will receive 1% extra credit toward their overall course grade.

Final exam - 25%

A comprehensive final exam will be held 12/11. No calculators are permitted.

Extra Credit

No adjustments will be made to final grades under any circumstances. Students will have the opportunity to earn extra credit over the course of the semester.

- As noted above, the team that produces the best research poster will earn 1%.

- Students may earn additional extra credit on homework when noted.

- Students may earn up to .5% extra credit per book summary (noted for each separate course unit).

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[1]Don't worry about whether your hypothesis was supported! Evaluation will be based on the criteria specified in the rubric on the final page of this syllabus, not the statistical significance of your results.

Class policies

Grade Appeals

I am happy to meet with students about grading issues, but only after they have met with the graduate TAs and submitted a grading request in writing. Please meet first with the graduate TAs with any concerns about evaluation.

If you wish to appeal the grading of an exam or assignment, you must return it to the graduate TAs. You must staple to the original graded exam or assignment a note that states which question(s) is (are) to be re-graded and why you believe that your answer deserves more credit. Nothing additional (notes, explanations, etc.) should be written on the original assignment and NO changes or erasures should be made on the original before regrading.

Technology in the classroom

You will frequently make use of computers in this course, during some lecture periods and during every lab. Please be respectful to your instructors and your peers by using your computers only for class-related purposes. Please put your phone away before class starts and don't bring it out.

Academic Honesty

Cheating and plagiarism will not be tolerated. I strongly encourage you to review the University's policies regarding academic honesty, which you can read here.

In general, if you have any question, please feel free to ask your TA or Professor Sinclair. Specific rules for this course:

- The homeworks and in-class work are "open book" and "open notes." However, you *may not* make use of answer keys or graded assignments provided by students from previous years for either homeworks or in-class assignments.

- You are to consult *only* with Professor Sinclair or a TA during exams.

- All exams will be "closed book" and no calculators will be permitted.

All cases of cheating or plagiarism will be referred to Washington University's Committee on Academic Integrity. If the Committee on Academic Integrity finds a student guilty of cheating, then the penalty will be (without exception) automatic failure of the course.

Students with disabilities

Students with disabilities enrolled in this course who may need disability-related classroom accommodations are encouraged to make an appointment to see me before the end of the second week of the semester. All conversations will remain confidential. Please also arrange to have the required documentation sent to me for any accommodations *as soon as possible.*

Religious observances

Some students may wish to take part in religious observances that occur during this semester. If you have a religious observance that conflicts with your participation in the course, please meet with me *before the end of the second week of the semester* to discuss accommodations.

A Brief History of This Course

This course has been extensively developed and tested by Professor Montgomery, who is on leave this semester. Much of the material we will use in this course, this syllabus included, was authored by him (and only slightly modified by me). Professor Montgomery's materials were also heavily influenced by Brendan Nyhan, a professor at Dartmouth.

Tentative Schedule

Date	Topic	Reading	Assignments	Notes
8/25	Syllabus and Pretest			
8/27	Programming Boot Camp	Nagler (pg 2-8) and Big Data (NPR)		
9/1	Programming Boot Camp	Google Development R 1.1- R 1.7, the R blog		
9/3	Programming Boot Camp	Google Development R 2.1- R 2.4 and Short R Intro		
9/8	Sports Analytics	OpenIntro Statistics, Chapter 1 "Intro to data" (except the special topics), pages 1-46 and Wheelan Chpt 1 and 2	HW 1 Due	
9/10	Sports Analytics	OIS, Chpt 3 (see reading notes), Slate NFL article on Blackboard, and the normal distribution YouTube videos		
9/15	Sports Analytics	OIS, Chpt 4 (the whole thing), Wheelan Chpt 3-5		
9/17	Sports Analytics	Wheelan Chpt 5.5-9		
9/22	Campaign Mobilization	Angrist and Pischke Chpt 1 and OIS Chpt 4 (the whole thing again)	HW 2 Due	
9/24	Campaign Mobilization	Homebase, OIS 5.2.3-5.4 and Reclaiming		
9/29	Campaign Mobilization	GOTV (Gerber and Green 2000)		
10/1	Campaign Mobilization	Social Pressure (Gerber, Green and Larimer)		
10/6	Micro-targeting	Angrist and Pischke Chpt 2 and Wheelan Chpt 10-12	HW 3 Due	
10/8	Micro-targeting	OIS Chpt 7 (7.1 and 7.2) and Podcast: The Data of Politics		

Date	Topic	Reading	Assignments	Notes
10/13	Micro-targeting	OIS Chpt 7 (7.1 through 7.2.4), these two YouTube videos here and here and this PBS video		
10/15	Micro-targeting	OIS Chpt 8 (8.1 and 8.2) and the Hersh/Schaffner article and this YouTube video on linear model assumptions	HW 4 Due	
10/20	Exam Review			
10/22	Midterm Exam			
10/27	Peltzman Effect	Peltzman (regulation) and Wheelan Chpt 13	Group and personal evaluation due	
10/29	Peltzman Effect	Cohen and Einav		
11/3	Peltzman Effect	Angrist and Pischke Chpt 4		
11/5	Peltzman Effect	Angrist and Pischke Chpt 5		
11/10	Flu Vaccine		HW 5 Due	
11/12	Flu Vaccine	Zaller		
11/17	Flu Vaccine	OIS Chpt 8.3 and 8.4		
11/19	Flu Vaccine	Nyhan	HW 6 Due (includes prospectus)	
11/24	Last Lecture			
12/1	Post-test		Poster file DUE	
12/3	Poster session			You may bring food
12/11	Final Exam			

Tentative Lab Schedule

Date	Topic	Datasets in use	Instructor
8/28	Programming Boot Camp		Dino
9/4	Programming Boot Camp		Dave
9/11	Sports Analytics		Adrián
9/18	Sports Analytics		Dave
9/25	Campaign Mobilization		Dino
10/2	Campaign Mobilization		Adrián
10/9	Microtargeting		Dave
10/23	Final Projects Initiated		Dino
10/30	Peltzman Effect		Adrián
11/6	Peltzman Effect		Adrián
11/13	Flu Vaccine		Dino
11/20	Flu Vaccine		Dave

Poster rubric (40 points total)

Score:	5	4	3	2
Introduction and theory	Precisely identifies null and alternative hypotheses and provides strong substantive and theoretical motivations for research project	Identifies null and alternative hypotheses and provides substantive and theoretical motivations for research project	Hypothesis described but null and/or alternative hypotheses not precisely or correctly specified; substantive and theoretical motivations incomplete or unconvincing	Theory incorrectly or vaguely stated; lacks appropriate substantive and/or theoretical motivation
Methods	Specifies all important aspects of how study was conducted in detailed and replicable fashion; convincingly motivates and defends key choices in design process	Specifies most important aspects of how study was conducted in relatively clear manner; addresses possible concerns about key choices in design process	Specifies some important aspects of how study was conducted; methods not always well-explained; does not sufficiently address possible concerns about choices in design process	Does not provide or clearly explain most important aspects of how study was conducted; lacks appropriate justification of key design choices
Results	Figures and tables illustrate findings in an intuitive and easy-to-understand way; text explains results precisely and without statistical errors; investigation of hypothesis thorough and detailed	Figures and tables illustrate findings reasonably clearly; textual explanations of results is clear; statistical approach largely correct and error-free	Figures and tables unappealing or poorly constructed; some imprecision or errors in textual discussion of results; hypotheses not thoroughly investigated	Figures and tables sloppy or hard to understand; text vague or incorrect; statistical errors in analysis; cursory investigation of hypotheses
Limitations and conclusions	Perceptive and detailed discussion of limitations of findings, potential explanations for those findings, substantive and theoretical conclusions, and possible future research	Clear and thoughtful discussion of limitations of findings, potential explanations for those findings, substantive and theoretical conclusions, and possible future research	Some useful discussion of limitations of findings, potential explanations for those findings, substantive and theoretical conclusions, and possible future research	Vague, incomplete, or unconvincing discussion of limitations, implications, and conclusions
Statistical analysis (poster)	Innovative use of statistical methods to answer research question; no errors in statistical analysis	Correct use of statistical methods to answer research question; no or few errors in statistical analysis	Potentially problematic use of statistical methods to answer research question; some errors in statistical analysis	Flawed use of statistical methods to answer research question; significant errors in statistical analysis
Statistical analysis (R script)	Replicates poster findings exactly from original data; clear, descriptive, and precise comments; correct and error-free statistical analyses and use of R	Statistical analysis and R code are largely correct; comments relatively clear and descriptive	Some errors in statistical analysis or R code; failure to fully replicate poster or provide appropriate comments	Does not replicate poster; lacks comments; many statistical and/or R errors
Graphical design	Exceptionally attractive design and layout; free of formatting problems	Attractive design and layout; no or few formatting problems	Somewhat attractive poster; some formatting problems	Difficult-to-read or messy poster design; many formatting problems
Writing quality	Exceptionally well-written—precise, clear, and mistake-free; concise and elegant	Very well-written—clear and articulate; few or no typos; not too long	Moderately well-written; some typos; wordy or vague	Unclear, awkward, or imprecise writing; numerous typos; too long and wordy or too short and vague

Self evaluation form (mid-semester; ungraded)

Team #:
Your name:

Part 1: Quantitative assessment (check one box for each item)

Cooperative learning skills	Never	Sometimes	Often	Always
Arrives on time and remains with team during activities				
Demonstrates a good balance of active listening and participation				
Asks useful or probing questions				
Shares information and personal understanding				

Self-directed learning	Never	Sometimes	Often	Always
Is well-prepared for team activities				
Shows appropriate depth of knowledge				
Identifies limits of personal knowledge				
Is clear when explaining things to others				

Interpersonal skills	Never	Sometimes	Often	Always
Gives useful feedback to others				
Accepts useful feedback from others				
Is able to listen and understand what others are saying				
Shows respect for the opinions and feelings of others				

Part 2: Qualitative assessment (1–3 sentences each)

1) What is the single most valuable contribution you make to your team?

2) What is the single most important way you could alter your behavior to more effectively help your team?

Peer evaluation form (mid-semester; ungraded)

Team #:
Colleague you are evaluating:
Your name (evaluator):

Part 1: Quantitative assessment (check one box for each item)

Cooperative learning skills	Never	Sometimes	Often	Always
Arrives on time and remains with team during activities				
Demonstrates a good balance of active listening and participation				
Asks useful or probing questions				
Shares information and personal understanding				

Self-directed learning	Never	Sometimes	Often	Always
Is well-prepared for team activities				
Shows appropriate depth of knowledge				
Identifies limits of personal knowledge				
Is clear when explaining things to others				

Interpersonal skills	Never	Sometimes	Often	Always
Gives useful feedback to others				
Accepts useful feedback from others				
Is able to listen and understand what others are saying				
Shows respect for the opinions and feelings of others				

Part 2: Qualitative assessment (1–3 sentences each)

1) What is the single most valuable contribution this person makes to your team?

2) What is the single most important way this person could alter their behavior to more effectively help your team?

Peer evaluation form (end of quarter)

Name/team #:

Please assign scores that reflect how you really feel about the extent to which the other members of your team contributed to your learning and/or your teams performance. This will be your only opportunity to reward the members of your team who worked hard on your behalf. (Note: If you give everyone pretty much the same score, you will be hurting those who did the most and helping those who did the least.)

Instructions: In the space below, please rate each of the other members of your team. Each member's peer evaluation score will be the average of the points they receive from the other members of the team. To complete the evaluation you should: 1) List the name of each member of your team in the alphabetical order of their last names and 2) assign a score to the other members of your team.

Team member	Score
1.	
2.	
3.	
4.	

Additional feedback

Please briefly describe the reasons for your highest and lowest ratings in the space below. These comments will be shared anonymously. Note: Your comments should be descriptive, not evaluative; as clear and specific as possible; phrased in constructive terms; and focused on areas in which the student has made especially valuable contributions or could improve in the future.

Reason(s) for your highest rating(s):

Reason(s) for your lowest rating(s):