

Quantitative Political Methodology

L32 363

pages.wustl.edu/montgomery/qpm

LECTURE	LABS
Monday and Wednesday	Thursday or Friday (Misc.)
10:00 – 11:00	Applied Statistics Classroom
Seigle Hall 304	Seigle Hall L016

Instructor Information

Jacob M. Montgomery, Ph.D.
Assistant Professor, Department of Political Science
Office: Seigle 242
E-mail: jacob.montgomery@wustl.edu
Telephone: (314) 935-9106
Office Hours: Tues. 9:00-11:00 and by appointment

Textbooks

Required:

Alan Angresti and Barbara Finlay. 2009. *Statistical Methods for the Social Sciences, Fourth Edition*. Upper Saddle River, NJ: Prentice Hall. ISBN: 978-0130272959

(GS) Gonick, Larry and Woollcott Smith. 1992. *The Cartoon Guide to Statistics*. Harper-Collins Publishers. ISBN: 13:978-0-06-273102-9

Suggested For Extra Help:

Statistical Reasoning. Online tutorial provided by the Open Learning Initiative at Carnegie Mellon.
More information at:
<http://oli.cmu.edu/courses/free-open/statistical-reasoning-course-details/>

Software

You will be using the R statistical package (<http://www.r-project.org/>). 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. As such, you need not rely on computer labs to complete your assignments. Please feel free to contact Professor Montgomery or a TA if you have any questions about software. *Please bring your laptops to the first lab session for help installing the program.*

Course description

Never before have political scientists had access to so much data about the attitudes and actions of individuals, institutions, and nations. Data on everything from the votes of members of the U.S. Senate in 1855 to terrorist attacks from around the globe are only a few clicks away.

This class is designed to make you an active participant in this new data-rich world. The goal is to introduce you to the methods and practices by which you can use this data to answer questions that are important to us as political scientists and citizens. What policies are most effective at reducing poverty? Which campaign ads are most effective at persuading voters? Can we affect the behavior of our Facebook friends just by sharing our opinions?

The purpose of this class is to teach you how to use data to answer these kinds of questions. This class will introduce you to the theoretical concepts you need to test claims about the political world and the practical skills you will need to conduct and present statistical analyses.

Although students will certainly be expected to engage with mathematics, formulas, and data analysis, the goals of the class are primarily conceptual rather than narrowly mathematical. The course will focus on helping students to understand the core concepts behind statistical tests, understand their uses (and limitations), learn to apply them appropriately to substantive problems of interest, and learn how to communicate findings to others. In addition, a major component of the course include learning how to collect, manage, and analyze data using computer software, and how to effectively communicate results to others.

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)
- Work collaboratively with other students to complete problem sets that apply concepts from class readings and short lectures
- Independently gather, analyze, interpret, and present your own data

Teaching Assistants

There are two graduate and one undergraduate teaching assistants. The graduate teaching assistants concentrate in social science or applied statistics and have vast experience in applied quantitative analysis. The undergraduate teaching assistant has successfully completed this course.

Each laboratory session will be led by one of the teaching assistants. Most grading will be done by the graduate TAs; some will be done by Professor Montgomery. The graduate teaching assistants will work closely in conjunction with Professor Montgomery on all issues of grading. I encourage you to get to know the teaching assistant responsible for your lab.

Graduate TA
Ms. Viktoryia Schnose
Email: vschnose@wustl.edu
Office Hours: Mondays 6-8pm
Office Hours: Seigle L012

Graduate TA
Ms. Betul Demirkaya
Email: betul.demirkaya@wustl.edu
Office Hours: Mondays 4-6pm
Office Hours Location: Seigle 255

Undergraduate TA
Alena Wigodner
Email: awigodner@wustl.edu
Office Hours: Tuesdays, 8-10pm
Office Hours Location: Whispers Cafe

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 quarter, you will be assigned to a team of five students. You will work with this team throughout the quarter on both in-class assignments and your final research project. 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 4-6 individuals. You will work with this team throughout the semester on in-class 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 individual assignments that you should prepare yourself, though you may ask your colleagues for help. Please turn them in at the on the specified date **at the beginning of class** with only your WUSTL ID number (i.e., not your name) written in the space provided. If you have a printing problem, you are responsible for emailing it to your graduate TA before class starts. Each student's lowest homework grade will be dropped in the final grade calculations. This option should be reserved for illness, family emergencies, broken alarm clocks, or other unforeseen events. No additional waivers will be granted.

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. This option should be reserved for illness, family emergencies, broken alarm clocks, computer crashes, or other unforeseen events. 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%). All members will turn in a single assignment at the end of class and will share their grade. However, **all absent students will receive a zero**; any attempt to include an ID number for an absent student will be considered an academic integrity violation. 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. This option should be reserved for illness, family emergencies, broken alarm clocks, or other unforeseen events. No additional waivers will be granted.

Midterm exam - 20%

The midterm exam will be held in class on October 16 and will cover the material discussed in class up to that point. Students will be provided with relevant statistical tables and are allowed to use a calculator with no information stored in memory.

Research project - 25%

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 lab 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 December 4*.¹ Note that the teams receiving the best poster grades are inevitably those that start early and those teams that come to me early and often to *me* for feedback.

There will also be an optional “poster session” (location/date TBD). The best poster in each section as selected by Political Science Department faculty will receive 1% extra credit toward their overall course grade.

Final exam - 25%

A comprehensive final exam will be held December 16 at 10:30 AM (Seigle 304). Students will be provided with relevant statistical tables and are allowed to use a calculator with no information stored in memory.

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 to provide an extra cushion in case of lazy team-mates, a malfunctioning calculator, or unusual anxiety during finals due to the opening of the Chamber of Secrets, an attack by rogue dementors, the sudden death of the Headmaster, or the return of You Know Who.

- As noted above, the team that earns the most votes for the best research poster will earn 1%.
- Students can also increase their final grade 1% by completing their official online course evaluations for both Professor Montgomery and the graduate TA.
- Students may earn up to another 1% for creating a video tutorial or other online content to be added to the course website. The topic of this video must be approved in advance, and the final product must be delivered to me before the final exam. You can find an example videos here: <https://pages.wustl.edu/montgomery/articles/3458>

¹Don'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. 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 folder provided outside the Political Science main office within 72 hours of the time when the graded assignment is returned to the class or your section. Assignments returned on Thursday or Friday must be returned by Noon on the following Monday. 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. A percentage of all written assignment are photocopied and compared to the regrade requests. Cheating will not be tolerated.

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 at: <http://www.wustl.edu/policies/undergraduate-academic-integrity.html>.

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

- You may work together on homework in small groups, but you should each prepare your answers separately.
- 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 Montgomery or a TA during exams.
- You will be allowed to bring one sheet of paper to exams to consult. This may be filled (front and back) with any equations or notes you may find helpful. Otherwise the exams will be "closed book."
- Graphic calculators are allowed during exams, but the memory must be cleared. Students should be prepared to show a confirmation of a cleared memory at the beginning of the exam.

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 *at least two weeks prior to the first exam*.

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.

Tentative Schedule

Date	Topic	Reading	Assignments	Notes
8/28	Introduction Class overview	AF:Chapter 1 GS: Chapter 1	Complete survey	
8/29-30	Installing R	Online content		Lab
9/2	NO CLASS (Labor Day)			
9/4	Random samples Data Types	AF: Chapter 2	PS1 distributed	
9/5-6	Importing csv files Univariate data display	AF:Section 3.1 GS: 7-13		Lab
9/9	Descriptive statistics	AF: Section 3.2-3.4 GS: 14-26		
9/11	Basics of probability	GS: Chapter 3 & 4 AF: 3.6, 4.1-4.3		
9/12-13	Describing data	Online content		Lab
9/16	Sampling distributions	GS: Chapter 6 AF: 4.4-4.7		
9/18	Some Distributions	GS: Chapter 5	PS1 Due	
9/19-20	Applied example	Online content		Lab
9/23	Confidence Intervals I	GS: Chapter 7 AF: 5.1-5.3	PS2 Distributed	
9/25	Confidence Intervals II	Online content		

Date	Topic	Reading	Assignments	Notes
9/26-27	CIs in R	Online content		Lab
9/30	Sample size	AF: 124-129		Mystery bags
10/2	Hypothesis Testing Intro		PS2 Due PS3 Distributed	Fisher's tea party
10/3-4	Poster discussion			Lab
10/7	Null Hypothesis Testing	AF: 6.1 GS: 137-142		
10/9	Hypothesis Testing II	AF: 6.2-6.5, 6.7 GS: 143-156		
10/10-11	Exam review			Lab
10/14	Catch up & review		PS3 Due	Review game
10/16	MIDTERM EXAM			
10/17-18	NO CLASS (Fall Break)			
10/21	Causality & ATE	AF: Section 10.1 Gerber & Green 21-39 GS: Chapter 10	PS4 Distributed	
10/23	Comparing Means 1	AF: 7.1, 7.3		
10/24-25	T-tests in R	Online Content		Lab
10/28	Comparing Means 2	AF: 7.2, 7.4		
10/30	Contingency Tables	AF: 8.1-8.4, 8.7		
10/31-11/1	Contingency Tables in R	Online Content		Lab
11/4	Bivariate Regression	AF: 9.1 - 9.3 GS: 187-192		
11/6	Inference with Regression	AF: 9.5	PS 4 Due PS5 Distributed	
11/7-8	Regression in R	Online Content		Lab
11/11	Corr. and Model Fit	AF: 9.4 GS: 193-198		
11/13	Multiple Regression	AF: 10.2-10.5, 11.1-11.4		

Date	Topic	Reading	Assignments	Notes
11/14-15	Multiple Regression in R	Online Content		Lab
11/18	Interactions & Dummies	AF: 11.5, 13.1-13.4		
11/20	Regression Diagnostics	AF: 9.6, 14.2, 14.3	PS 5 Due PS 6 Distributed	
11/21-22	Regression Diagnostics Bivariate Data Display	AF: 3.5		Lab
11/25	Logit	AF: 15.1-15.3		
11/27	NO CLASS			
11/28-29	NO CLASS			
12/2	Catch up and posters			
12/4	Exam review		Poster files due PS6 Due	Dist. Exam review
12/5-6	Poster presentations			
TBD	Poster session			
12/16	Final Exam			10:30AM-12:30PM

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 an average of ten points to the other members of your team and, 3) differentiate some in your ratings; for example, you must give at least one score of 11 or higher (maximum = 15) and one score of 9 or lower.

	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):