# Quantitative Political Methodology
## L32 363

pages.wustl.edu/montgomery/qpm

| LECTURE | LABS |
|---|---|
| Monday and Wednesday | Thursday or Friday (Misc.) |
| 11:00 – 12:00 | Applied Statistics Classroom |
| Location TBD | Seigle Hall L006 |

## 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:*

(DK) Dietz, Thomas and Linda Kalof. 2009. *Introduction to Social Statistics: The Logic of Statistical Reasoning*. Wiley-Blackwell. ISBN: 978-1-4051-6902-8

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

*Suggested:*

*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/

*Also useful:*

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

## Software

You will be using the R statistical package (http://www.r-project.org/) as distributed by RStudio (http://rstudio.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? Do domestic political institutions systematically impact currency markets?

The purpose of this class is to teach you how you can 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 components 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)

- Independently gather, analyze, interpret, and present your own data

## Class structure

This class will reduce the number of traditional lectures as much as possible. Students will be provided with readings, videos, and other resources to learn the basic materials at home and at their own pace. Class time will then be dedicated to discussion, group work, and hands-on demonstrations.

# Requirements and Evaluation

The requirements for this course are simple:

- Do the readings and assigned work *before* class.

- Complete all assignments on time.

- Participate actively during class and lab

- Sit for two exams

- Develop and present an original group research project

The twice-a-week "lecture" sessions will focus primarily on substantive issues as well as the statistical issues covered in the readings and online course materials. The lab sessions will serve as a software tutorial and as a seminar-like setting where students work in groups on assignments with their team.

## Assignments and grading

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. No incompletes will be given for assignments, exams, or the course. Exceptions will be granted only under truly extraordinary circumstances. Failure to meet the requirements of the course will result in a failing grade. If a student needs to miss an examination or requires special accommodations, prior arrangements should be made with Professor Montgomery at least two weeks in advance.

### 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.

### 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 (location TBD). 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 5. The best poster in each section as selected by Political Science Department faculty will receive 1% extra credit toward their overall course grade.[1]

---

[1]Dont 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.

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

*Problem sets*, or homeworks, will be distributed throughout the course. 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*, or short quizzes, will be administered throughout the semester. These are designed to ensure that students arrive to class prepared to engage in discussion and team activities. (Many in-class team activities will be graded, so these assessments are necessary to ensure that all members are ready to contribute.) You should complet IPAs yourself with no assistance from your colleagues. Each student's two lowest IPA 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.

*In-class assignments* will be completed during lecture an lab periods throughout the semester. Some of these will simply involve completing worksheets completed in groups students choose themselves, while other will be more involved team projects. For assigned-team projects, 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**. Students missing more than five minutes of class time will counted as absent. Each student's three 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 10 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.

**Final exam - 30%**

A comprehensive final exam will be held December 18 at 10:30 AM (location TBA). Students will be provided with relevant statistical tables and are allowed to use a calculator with no information stored in memory.

**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 |

## 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.

Students can 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. Details about this option will be provided later in the semester. As noted above, the team that earns the most votes for the best research poster will also earn 1%.

## Teaching Assistants

There are two graduate and five undergraduate teaching assistants assigned to this course. The graduate teaching assistants concentrate in social science or applied statistics and have vast experience in applied quantitative analysis. The undergraduate teaching assistants have all successfully mastered the materials we will cover.

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 and student evaluation. I encourage you to get to know the teaching assistant responsible for your lab.

Graduate TA
Ms. Viktoryia Schnose
Email: schnose@wustl.edu
Office Hours: Th, 4-6pm
Office Hours: Stats lab

Graduate TA
Mr. Kevin McAlister
Email: kevinmcalister@wustl.edu
Office Hours: F 12-1, 2-3
Office Hours Location: Stats lab

Undergraduate TA
Nicolas Dumas
Email: nicolas.dumas@wustl.edu
Office Hours: Sat. 11am-1pm
Office Hours Location: TBD

Undergraduate TA
Carina Fowler
Email: carina.fowler@go.wustl.edu
Office Hours: Tues. 5-7pm
Office Hours Location: TBD

Undergraduate TA
Rohan Mathur
Email: rmathur@wustl.edu
Office Hours: Sat. 2-4pm
Office Hours Location: TBD

Undergraduate TA
Jake Nathan
Email: jnathan@wustl.edu
Office Hours: Sun. 8-10pm
Office Hours Location: TBD

Undergraduate TA
Jaime Zucker
Email: jaime.zucker@wustl.edu
Office Hours: Sun. 2-4pm
Office Hours Location: TBD

# Class policies

### Grade Appeals

I am happy to meet with students about grading issues, but only after they have met with the graduate TAs. You should plan to first meet 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 in the Political Science main office within 48 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.

### Attendance

You will not be graded directly on your attendance. Poor attendance will be reflected in your peer evaluations and your in-class assignment grades. However, I strongly suggest students expecting to receive and A in this course attend all lectures and labs.

Students are allowed to attend an alternative lab session once during the semester but ONLY with the prior permission of both graduate TAs. Permission will NOT be granted weeks that involve team projects during lab or for the larger (and more crowded) lab sections.

### 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. Put your phone away before class starts and don't bring it out.

### 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 appropriate accommodations.

**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.

- Your are to consult *only* with Professor Montgomery orc your 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.

| Date | Topic | Reading | Assignments | Notes |
|---|---|---|---|---|
| 8/29 | Introduction<br>Class overview | DK: xxvi-31<br>GS: Chapter 1 | Complete survey | Lecture only |
| 8/30-31 | Installing R | Online content | | |
| 9/3 | NO CLASS (Labor Day) | | | |
| 9/5 | Class overview<br>Data Types<br>Random samples | DK: Chapter 2 | PS1 distributed | Class survey |
| 9/6-7 | Importing csv files<br>Univariate data display | DK: 66-96, 104-109<br>GS: 7-13 | | Braz./Arg. Polls |
| 9/10 | Descriptive statistics | DK: Chapter 4<br>GS: 14-26 | | Income dist. |
| 9/12 | Basics of probability | GS: Chapter 3 & 4<br>DK: Chapter 7 | | Lecture only |
| 9/13-14 | Applied example | Online content | | Polarization/Cong. |
| 9/17 | Sampling distributions | GS: Chapters 4 & 6<br><br>DK: Chapter 8 | PS1 Due | Population, Sample, Sampling distribution parameters |
| 9/19 | Some Distributions | GS: Chapter 5 | PS2 Distributed | Working with tables, one-sided, etc. |
| 9/20-21 | Applied example | Online content | | Pollster API Data |
| 9/24 | Confidence Intervals | GS: Chapter 7 | | Lecture normal/known variance |
| 9/26 | CIs for normal | DK: 295-308 | | Class height |
| 9/27-28 | CIs in R | Online content | | ANES Thermometer |
| 10/1 | CIs for proportions | DK: 308-309 | PS2 Due | Be the pollster (TAPS) |
| 10/3 | Sample size | AF: 124-129 | PS3 Distributed | Mystery Bag |
| 10/4-5 | Data sources | | | Finding data |
| 10/8 | H-testing (Small-n qual) | GS: 137-139 | | Fisher's tea party |
| 10/10 | Null hypothesis testing | GS 140-142, 146-148<br>DK: 319-329, 332-334 | Exam review | Lecture |

| Date | Topic | Reading | Assignments | Notes |
|---|---|---|---|---|
| 10/11-12 | Exam review | | | Project reports |
| 10/15 | Catch up & review | | PS3 Due | Review game |
| 10/17 | MIDTERM EXAM | | | |
| 10/18-19 | NO CLASS (Fall Break) | | | |
| 10/22 | H-test (Large-n quant.) | AA Chapter 6 | PS4 Distributed | Lecture |
| 10/24 | H-test (Small-n quant.) | GS Chapter 8 | | Jury selection |
| 10/25-26 | Bivariate data display | DK Chapter 5 | | ? ? |
| 10/29 | Causality & ATE | DK Chapter 6 Gerber&Green 21-39 | PS4 Due | Lecture |
| 10/31 | Comparing means (Quant.) | DK 334-362 | PS5 Distributed | Roommate data |
| 11/1-2 | T-test in R | Online Content | | ANES Data |
| 11/5 | Comparing means (Qual.) | AA Chapter 7 GS Chapter 9 | | ? ? TAPS |
| 11/7 | Contingency Tables | DK Chapter 12 | | Peremptory chall. |
| 11/8-9 | Contingency Tables in R | Online Content | | Titanic |
| 11/12 | Bivariate regression | DK 436-453 GS Chapter 11 | PS5 Due | Pres. elections |
| 11/14 | Inference with regression | DK 454-475 | PS6 Distributed | Pres. elections |
| 11/15-16 | Regression in R | Online Content | | OOS |
| 11/19 | Team project work day | | | |
| 11/21 | BREAK: NO CLASS | | | |
| 11/26 | Correlation & Model Fit | AA 283-288 | | Lecture |
| 11/28 | Multivariate regression | DK Chapter 14 | | Lecture |

| Date | Topic | Reading | Assignments | Notes |
|------|-------|---------|-------------|-------|
| 11/29-30 | Multivariate regression | Online content | | OOS |
| 12/3 | Interactions & Logit | Online Content | PS 6 Due | Lecture |
| 12/5 | Exam review | | Poster files due | Dist. Exam review |
| 12/6-7 | Poster presentations | | | |
| TBD | Poster session | | | |
| 12/18 | 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 |