

**SOCIAL SCIENCE RESEARCH METHODS**  
**Government 300 - 001 (CRN: 70852)**  
**George Mason University**  
**Tuesdays & Thursdays, 3:00pm – 4:15pm**  
**Blueridge Hall 129**  
**Fall 2018**

Professor: **Jennifer Nicoll Victor, Ph.D.**  
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Course Website: Available for enrolled students at <http://blackboard.gmu.edu>

Teaching Assistant: **Erica Seng-White**  
TA Email: [esengwhite@gmail.com](mailto:esengwhite@gmail.com)  
TA Office: Graduate Student carrels, accessed via Research Hall 359  
TA Office Hours: Tuesdays & Thursdays 10:30am – 12:30pm

All students in this course are required to be enrolled in one of the following laboratory sections, led by the TA:

Section1: Mondays, 1:30 – 2:20pm, Innovation Hall 223 (section CRN 71702)  
Section2: Fridays, 10:30 – 11:20pm. Innovation Hall 129 (section CRN 71703)

## **I. Course Description**

This course provides an introduction to social scientific research methods with applications to government and politics. Using tools we learn in this course, we can use data to answer questions like: Do police arrests show evidence of racial bias? Are women more likely to vote for Democrats than men? Do people of all income levels have equal access to healthcare services and health insurance? This course introduces basic principles of statistical inference, causal reasoning, and statistical programming. Broadly, the course covers causality, measurement, prediction, probability, and uncertainty. Based on the scientific method, students will learn how to organize, conduct, document, and report a scientific study on questions related to government or politics. Students will learn how to process and analyze data using the R statistical programming language. In addition to learning how to operate the software, students will learn how to manipulate and describe data, test univariate and multivariate hypotheses, and develop graphical visualizations of data and findings.

## **II. Course Objectives**

I have two broad objectives for this course. First, students will master the foundations of sound social scientific research design. Second, students will become comfortable using the R statistical language to manage and analyze data. The combination of these skills will lead to greater confidence in conducting investigations on questions of interest in government, policy,

and political science. I additionally hope this confidence feeds students' curiosity about the world and their ability to make contributions to important social and political problems.

### **III. Course Structure**

The class meets three times per week. All students will attend two lectures, conducted by Professor Victor. Additionally, each student will enroll in one weekly laboratory section. There are two options of lab sections in the schedule. Students are required to attend at least one per week. The sections will be led by the teaching assistant and conducted in a classroom computer laboratory. The primary activity in the lab section will be learning how to use the software and gaining practice with the techniques.

### **IV. The value of GOV 300**

Most of you have enrolled in this course because it is required. Some of you may have some anxiety about learning statistics or a programming language. If you have no experience with programming, there will be a challenging learning curve to overcome. The course is built with all of these challenges in mind. It is designed to help you overcome your trepidation about these topics and to appreciate the benefits of using data to make discoveries about the world. Graduates of GOV 300 have used statistics in other academic pursuit and been able to showcase their skills to their advantage on the job market upon graduation. Many students who take this course contact previous instructors to say how valuable it is in helping them to achieve their post-graduate goals. We live in a data heavy world. Students who graduate with the substantive knowledge about politics and the skills to manage and analyze data have valuable assets. In short, the pain of this course is worth it. Stick with it. And don't just take my word for it; you might like this 2009 *New York Times* article, ["For today's graduate, just one word: statistics."](#)

### **V. Teaching Philosophy and Teaching Style**

My teaching philosophy is based on three primary principles.

- First, I believe the gap between undergraduate and graduate coursework in political science is too broad. I therefore introduce advanced theoretical concepts in undergraduate classes so that students understand the true value of studying politics as a science; moreover, should any student choose to pursue advanced or graduate work in political science, they will be well prepared.
- Second, I believe in incorporating current events into classroom lessons. Nothing in science seems concrete until one can "see it with their own eyes." Reading a daily newspaper and following current events, then applying theoretical concepts to political happenings helps to clarify theoretical concepts and demonstrate their utility.
- Third, as learning a programming language is challenging and can be frustrating. I aim to help students develop workflow habits that can ease the frustrations and provide guidance in meeting the challenge of learning this software. The modern world

demands today's graduates have transportable technical skills and I want those who complete this course to have added to these skills and have great confidence in your ability to continue to add to such skills beyond the course.

- Finally, as an instructor and a leader of class discussions on everything from lawmaking to elections, I aim to remain politically neutral and non-partisan. Students should learn to collect and evaluate information on their own. I would not want students who disagree with my political views to hear all course information with a skeptical ear; nor would I want students who tend to agree with my views to accept everything I say at face value. I encourage students to express their views, be critical, and challenge information when it is appropriate.

My teaching style is consistent with my philosophy. I use a Socratic-style in the classroom in which I frequently ask questions and encourage an interactive learning experience. I do my best to learn students' names, encourage participation, and create, what I hope is, an open learning environment where students feel free to question, comment, and explain how they view course content. Such an environment helps to foster student interaction, thinking, and analytical and creative skills. Moreover, while lectures are important because they help to distribute necessary information and facts, they are not usually the most effective way to learn information. For this reason, we will do a variety of activities in the classroom. Successful performance in this course will include classroom participation and working in and out of class with your peers.

## VI. Student Responsibilities

A. *Class Attendance and Participation.* Learning is an *active*, rather than *passive*, exercise. Accordingly, every student is expected to attend class as well as be prepared to ask questions about and comment on the readings. You need to complete the daily reading assignment *prior* to the class meeting. You will be much more successful in this class if you attend regularly, take notes, pay attention, and participate.

B. *Readings.* As is the case with attendance, keeping pace with the reading is essential to succeeding in this class. It is *your* responsibility to obtain copies of the readings prior to the date we will discuss them in class. I will do everything I can to make this task easier for you. You will be much more successful in this course if you complete the assigned readings and **take notes** on them.

C. *Technology.* Laptops, tablets, and smart phone are a considerable distraction in class. A student can become easily distracted by non-class alternatives that compete for your attention. In addition, [research](#) shows that students tend to retain more information by taking notes by hand rather than on a computer. However, this course is technology heavy as we will be learning statistical software that is probably unfamiliar to you. It requires considerable practice and training. Therefore, I leave it to students to make their own choice about how to maximize

their in-class learning. If you choose to use a laptop, make a commitment to only using content related to class.

*D. Cheating, Plagiarism, and Academic Integrity.* Students in this course will be expected to comply with the George Mason University Honor Code (see <http://honorcode.gmu.edu/>). There are three simple guidelines to follow with respect to academic integrity: (1) all work you submit must be your own; (2) when using the work or ideas of others, including fellow students, give full credit through accurate citations; and (3) if you are uncertain about the expectations for any assignment, ask for clarification. Any student engaged in any academic misconduct *will receive an F on the offending exam or assignment*. Egregious violations will result in an F grade for the course and will be reported to the appropriate Dean's office. These violations include cheating on an exam, using someone else's work as your own, and plagiarizing the written word. Plagiarism (using someone else's words or ideas without providing credit or citation) is a serious offense. *If you have any questions at all about what constitutes cheating, plagiarism, or academic misconduct, please ask the instructor.*

*E. Students with Disabilities.* If you have a disability for which you are or may be requesting an accommodation, please let me (the instructor) know and contact the Office of Disability Services (ODS) at (703) 993-2474 or <http://ods.gmu.edu>. All discussions with me regarding disabilities are confidential.

*F. Email.* Mason uses only Mason e-mail accounts to communicate with enrolled students. Students must activate their Mason e-mail account, use it to communicate with their department and other administrative units, and check it regularly for important university information including messages related to this class. *Email etiquette:* An email is a professional correspondence; do not write it as if it is a text message, snap, tweet, or IM. Always use a salutation and sign your name. Consider creating a signature that automatically inserts your name and basic contact information at the bottom of your emails. Use proper punctuation and grammar.

*G. Dropping or withdrawing.* The last day to add this course is September 4, 2018. The last day to drop the class with no tuition penalty is September 9, 2018. Students may elect to withdrawal from the class (with 100% tuition liability) between September 9 – September 30. From October 1 – October 30 students may elect to use a Mason "selective withdrawal" to drop the course (you can only do this three times during your time as a Mason student). After October 28 there are no options for withdrawing from the course. More information on drop and withdrawal policies is [here](#). If you have concerns about your performance in the course, or you find yourself unable to perform for any reason, you should discuss your concerns with your teaching assistant, professor, advisor, and Assistant Dean (in that order). Students seeking to drop or withdrawal are responsible for doing so on their own in Patriot Web. If you need help or advice, please see your academic advisor. The advisors in the Schar School main office (3<sup>rd</sup> floor Research Hall) can also help.

## VII. Course Requirements and Graded Evaluation

There are four graded requirements for this course, described below. Grades will be calculated on a non-curved typical A-F scale where,

93-100	A	87-89	B+	77-79	C+	67-69	D+	< 60	F
90-92	A-	83-86	B	73-76	C	63-66	D		
		80-82	B-	70-72	C-	60-62	D-		

For your convenience and workflow management, this google calendar has all of the course due dates and events pre-loaded: <https://goo.gl/wVu3Ci>

*Daily Quizzes (10%)* Each lecture will begin with a short quiz that helps to reinforce the concepts or tools taught in class. The quizzes are open book, open note, and can be done collaboratively. Each student must submit their own, original work. Quizzes are due in class. Make-up quizzes can be taken with a grade penalty, unless there is an excused absence. Each student's three lowest quiz scores will be excluded from the course grade.

*Programming assignments (qss-swirl) (10%)* Programming assignments are graded on a pass/fail basis and expected to be completed on time. They will be available on Blackboard and evaluated by your teaching assistant. **Collaboration is permitted.** Each student must write up their own code. Assignments are based on the textbook and designed to check whether you understand the material. You will need access to R and R-Studio to complete these assignments. We'll do the following Swirl courses in qss-swirl (students may do any additional swirl tutorials they like on their own).

1. Intro1----- due September 7
2. Intro2----- due September 7
3. Causality1 ----- due September 14
4. Causality2 ----- due September 21
5. Measurement1----- due September 28
6. Measurement2----- due October 12
7. Prediction1----- due October 19
8. Prediction2----- due October 26
9. Prediction3----- due October 26
10. Probability1----- due November 2
11. Probability2----- due November 9
12. Uncertainty1----- due November 16
13. Uncertainty2----- due November 30
14. Uncertainty3----- due November 30

*Problem Sets (10%)* There will be four problem sets during the semester. Problem sets provide an opportunity to practice statistical concepts and engage analytically with data. **Collaboration is permitted.** Each student must write up their own responses.

Problem Set 1 (Exercise 2.8.3) due **Sept. 21**

Problem Set 2 (Exercise 3.9.2) due **Oct. 12**

Problem Set 3 (Exercise 4.5.1) due **Nov. 9**  
Problem Set 4 (Exercise 7.5.1) due **Nov. 30**

*Midterm Exam (20%)* There will be a take home midterm examination that will be due in class on **Thursday, October 25**. NO COLLABORATION IS ALLOWED ON THE MIDTERM EXAM. Students will sign an honor code statement indicating that all work is their own.

*Research Paper (25%)*. All students will write a research paper on a topic selected from a list of provided research questions. Final products will be 8 – 12 pages (excluding titles, bibliography, tables, graphs, notes). The paper will highlight the following skills: motivating a research question, stating a research question, reviewing literature on a question, developing testable hypotheses, describing the data, describing the statistical test, reporting the findings. In their papers, students are expected to showcase skills learned in class. The assignment will be scaffolded in the following way. Details and examples are available on Blackboard.

- Step 1: Paper introduction (state and motivate the research question; 1-2 paragraphs) **(DUE: September 14)** 5%
- Step 2: Annotated bibliography (6-12 sources) **(DUE: September 28)** 5%
- Step 3: Literature Review, Theory, and hypotheses (2-4 pages) **(Due: October 19)** 10%
- Step 4: Research design (2-3 pages) **(Due: November 2)** 10%
- Step 5: Empirical test and findings (2-3 pages) **(DUE: November 20)** 20%
- Step 6: Complete draft (8-12 pages) **(DUE: December 6)**. 50%

*Final Exam (25%)* There will be an in-class, comprehensive final examination. The exam will be OPEN note. The exam is on **Thursday, December 13, 1:30pm – 4:15pm**.

#### **VIII. Policies on late work, make-ups and extra credit**

- A. *Can I submit an assignment late?* Students may submit an assignment after its due date for a 5% (off the total possible score) penalty per-24-hour period that the assignment is late.
- B. *What if I miss an exam?* Make-up exams are only given in the case of verified illness or family emergency, such as a death in the family. Documentation is necessary to receive a qualified make-up examination. Students who arrive late to an in-class exam may still sit for the exam if no other student has already submitted their exam; once a single student hands-in their exam, no others may begin the exam.
- C. *What can I do if I perform poorly on an assignment?* Students who receive a 72% or less on a homework assignment or essay (not exam) may re-do the assignment for a replacement grade. Re-do assignments are subject to a 5% per day penalty starting from the day graded assignments were returned to students in class (regardless of attendance). Assignments that were originally submitted past the due date are NOT eligible for re-do.

## IX. Resources for Students

College can be a stressful experience. It is normal to sometimes feel overwhelmed, out of place, or insecure. Self-care strategies are important for maintaining your physical, emotional, and academic health. Developing self-awareness about stress, anxiety, or health issues is an important part of your development and success as a student. The following campus resources are available to you to help you learn to manage the complexities of your college career:

[Center for Academic Advising, Retention, and Transitions](#)

[Compliance, Diversity, and Ethics \(including sexual misconduct and harassment; Title IX\)](#)

[Counseling and Psychological Services](#)

[Disability Services](#)

[Financial Aid](#)

[International Programs and Services](#)

[Learning Services](#)

[Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning Resources](#)

[Mathematics Tutoring Center](#)

[Military Alliance Program](#)

[Office of Diversity, Inclusion, and Multicultural Education](#)

[Student Conduct](#)

[Student Health Services](#)

[University Career Services](#)

[University Life](#)

[University Writing Center](#)

## X. Texts

The reading assignments are chosen to buttress and expand on the analytic foundation laid in class. **Please notify the instructor about problems obtaining the readings as soon as possible.** The following materials are required and can be found at the campus bookstore.

### [Required Readings](#)

Imai, Kosuke. 2018. *Quantitative Social Science: An Introduction*. Princeton: Princeton University Press.

Textbook website with resources: <http://qss.princeton.press/>

### [Recommended Reading](#)

Grolemund, Garrett, and Hadley Wickham. n.d. *R for Data Science*. Accessed January 16, 2018. <http://r4ds.had.co.nz/>.

Kellstedt, Paul M., and Guy D. Whitten. 2013. *The Fundamentals of Political Science Research*. 2 edition. Cambridge: Cambridge University Press.

Monogan, III, James E. 2015. *Political Analysis Using R*. 1st ed. 2015 edition. New York, NY: Springer.

## XI. Software

We will use the R statistical programming language to learn how to manipulate and analyze data. R is **free** and open-source, meaning enterprising users can contribute and share new R functions and sub-programs, leading to a constantly improving tool. To operate R we will use R-Studio, a user-interface that makes R a bit nicer to operate. R is a [popular, powerful, and growing software](#) with many publicly available resources to help learners. Links for downloading, installing, and learning about these resources appear below.

R <https://www.r-project.org>

Free, open-source, statistical programming language. Download R from the “Comprehensive R Archive Network” (CRAN) from any mirror of your choice. [Here is a 2 minute YouTube video on installing R and R-Studio](#)

R-Studio <https://www.rstudio.com>

A user interface that operates “on top” of R and makes it friendlier to use.

Swirl <http://swirlstats.com/>

A “package” within R that helps you learn R. Completing swirl exercises associated with the textbook will help you learn the commands, syntax, and programming to do social science data analysis.

R for Data Science (optional) Wickham, Hadley, and Garrett Golemund. 2017. *R for Data Science*. O’Reilly. <http://r4ds.had.co.nz/> <http://r4ds.had.co.nz/transform.html>

This is a free on-line textbook that is very helpful for learning R, looking up commands, and getting advice. Please use it as a reference

R Bloggers (optional) <https://www.r-bloggers.com/>

This website is a wealth of resources, example code, and helpful users who can help troubleshoot problems.

StackOverflow (optional) <https://stackoverflow.com/>

A user’s help website where people post questions and other users will answer them. Search their archives to find help with all sorts of puzzles.

Quick-R (optional) <https://www.statmethods.net/index.html>

Another resource for learning R, getting help, instructions, example help, etc.

## XII. Course Schedule and Reading Assignments

*For your convenience and workflow management, this google calendar has all of the course due dates and events pre-loaded: <https://goo.gl/wVu3Ci>*

### Introduction

Week 0: August 27 – Aug. 31



- **SPECIAL NOTE: NO CLASS ON THURSDAY, AUGUST 30 DUE TO APSA**
- TOPIC: Course overview, workflow, motivations
- READING: Imai, Chapter 1 (sections 1.1 – 1.2)
- LAB: Installation, getting started
- ASSIGNMENTS:
  - Download and Install R, R-Studio, qss-swirl (see p. 9)

#### Week 1: Sept. 3 – 7

- TOPIC: Studying politics scientifically, introduction to R
- READING:
  - [Noel, Hans. 2010 "Ten Things Political Scientists Know that You Don't"](#)
  - Imai: Chapter 1 (section 1.3)
- LAB: Data wrangling; workflow
- ASSIGNMENTS:
  - qss-swirl Intro1, Intro2 due Sept. 7

### Causality

#### Week 2: Sept. 10 – 14

- TOPIC: Randomized Experiments
- READING: Imai, Chapter 2 (sections 2.1 – 2.4)
- LAB: data types, subsetting, tapply
- ASSIGNMENTS:
  - qss-swirl causality1 due Sept. 14
  - Paper Introduction due Sept. 14

#### Week 3: Sept. 17 – 21

- TOPIC: Observational Studies
- READING: Imai, Chapter 2 (sections 2.5 – 2.7)
- LAB: Summary statistics
- ASSIGNMENTS:
  - qss-swirl causality2 due Sept. 21
  - Problem Set 1: complete exercise 2.8.3, "Success of Leader Assassination as a natural experiment." DUE SEPT. 21

### Measurement

#### Week 4: Sept. 24 – 28

- TOPIC: Survey sampling
- READING:
  - Imai, Chapter 3 (section 3.1 – 3.4)
- LAB: Visualization
- ASSIGNMENTS:
  - qss-swirl Measurement1 due Sept. 28
  - Paper annotated bibliography due Sept. 28

Week 5: Oct. 1 – 5

- TOPIC: Research ethics, reviewing literature
- READING:
  - “History of Research Ethics | Research and Economic Development | University of Nevada, Las Vegas.” n.d. Accessed January 18, 2018.  
<https://www.unlv.edu/research/ORI-HSR/history-ethics>.
  - “Ethical Codes & Research Standards.” 2016. Text. HHS.Gov. February 19, 2016.  
<https://www.hhs.gov/ohrp/international/ethical-codes-and-research-standards/index.html>.
  - Knopf, Jeffrey W. 2006. “Doing a Literature Review.” *PS: Political Science & Politics* 39 (01):127–132.  
[http://journals.cambridge.org/abstract\\_S1049096506060264](http://journals.cambridge.org/abstract_S1049096506060264)
- LAB: Zotero, visualization
- ASSIGNMENTS:
  - Complete Blackboard modules on IT ethics
  - Download and install Zotero

Week 6: Oct. 8 – 12

- **SPECIAL NOTE: Monday, October 8 is “fall break.” There will be no lecture on Tuesday, October 9 because Monday classes will meet this day.**
- TOPIC: Clustering
- READING:
  - Imai, Chapter 3 (sections 3.5 – 3.7)
  - “7 Visualizations You Should Learn in R.” 2016. *R-Bloggers* (blog). December 29, 2016. <https://www.r-bloggers.com/7-visualizations-you-should-learn-in-r/>.
  - Wickham, Hadley, and Garrett Grolemund. 2017. *R for Data Science*. O’Reilly. <http://r4ds.had.co.nz/>, Ch. 3 “Data Visualization”
  - Machlis, Sharon. 2017. “Beginner’s Guide to R: Painless Data Visualization.” *Computerworld*. August 18, 2017.  
<https://www.computerworld.com/article/2497304/business-intelligence/business-intelligence-beginner-s-guide-to-r-painless-data-visualization.html>.
- LAB: correlation, matrices, lists, k-means, cbind
- ASSIGNMENTS:
  - qss-swirl Measurement2 due Oct. 12
  - Problem Set 2: Exercise 3.9.2, “Political Efficacy in China and Mexico,” DUE OCT. 12

**Prediction**

Week 7: Oct. 15 – 19

- TOPIC: Prediction and loops
- READING: Imai, Chapter 4 (section 4.1)

- LAB: loops
- ASSIGNMENTS:
  - Paper literature review due Oct. 19
  - qss-swirl Prediction 1 due Oct. 19
  -

Week 8: Oct. 22 – 26

- TOPIC: Regression
- READING: Imai, Chapter 4 (sections 4.2 – 4.3)
- LAB: regression
- ASSIGNMENTS:
  - qss-swirl Prediction2 and Prediction3 due Oct. 26
  - Take home midterm available Monday, Oct. 22
  - **TAKE HOME MIDTERM EXAM DUE IN CLASS OCT. 25**

### Probability

Week 9: Oct. 29 – Nov. 2

- TOPIC: Probability
- READING: Imai, Chapter 6 (sections 6.1 – 6.2)
- LAB: Simulations and conditional probability
- ASSIGNMENTS:
  - qss-swirl Probability 1 due Nov. 2
  - Paper research design due Nov. 2

Week 10: Nov. 5 – 9

- TOPIC: Random variables and probability distributions
- READING: Imai, Chapter 6 (sections 6.3 – 6.5)
- LAB: Simulations and Monte Carlo
- ASSIGNMENTS:
  - qss-swirl Probability2 due Nov. 9
  - Problem set 3: Exercise 4.5.1 “Prediction Based on Betting Markets” DUE NOV. 9

### Uncertainty

Week 11: Nov. 12 – 16

- TOPIC: Estimation
- READING: Imai, Chapter 7 (sections 7.1.1 – 7.1.3)
- LAB: standard error, confidence intervals
- ASSIGNMENTS:
  - qss-swirl Uncertainty1 due Nov. 16

Week 12: Nov. 19 – 20

- **Special Note: Thanksgiving Break Nov. 21-25**
- TOPIC: Estimation

- READING: Imai, Chapter 7 (sections 7.1.4 – 7.2.2)
- LAB: critical value, margin of error, student's-t distribution, hypothesis testing
- ASSIGNMENTS:
  - Paper empirical section due Nov. 20

Week 13: Nov. 26 – 30

- TOPIC: Hypothesis Testing
- READING: Imai, Chapter 7 (sections 7.2.3 – 7.4)
- LAB: model-based inference
- ASSIGNMENTS:
  - qss-swirl Uncertainty2 due Nov. 30
  - qss-swirl Uncertainty3 due Nov. 30
  - Problem set 4: Exercise 7.5.1, "Sex Ratio and the Price of Agricultural Crops in China," due Nov. 30

Week 14: Dec. 3 – 7

- TOPIC: Review, Practice, and paper workshops
- READING: None
- LAB: students' choice
- ASSIGNMENTS:
  - Paper final draft due Thursday, December 6

Week 15: Dec. 12 – 16

In-class, open-note, comprehensive final examination.

**FINAL EXAM: Thursday, December 13, 1:30pm – 4:15pm.**