

Introduction to Political Methodology

POLS 7012, Fall 2019

Monday 3:35-6:35, Baldwin 301

Instructor: Jamie Monogan

Office: Baldwin 413

Office hours: Wednesday 3:30-6:00 or by appointment.

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Course Description and Goals

This course is designed to provide mathematical and statistical tools useful for the rest of the methods sequence, as well as for other courses in formal theory or mathematical modeling. Throughout the course, the mathematical tools are motivated by applications to the general problem of how politics can be modeled for purposes of statistical analysis, deductive reasoning, or conceptual theorizing. Contemporary Political Science research in all subfields uses statistical techniques and formal modeling. Consequently, a basic understanding of these methods—and of the building blocks behind them—is crucial if one is to be a sophisticated consumer of Political Science literature and to become a producer of such research.

By learning to solve problems covering the mathematical topics above, students will learn to represent political phenomena symbolically, to reason about social inquiry formally, and to test theories and hypotheses quantitatively. These core skills apply to future courses in methodology as well as substantive politics. By the end of the course, you should be able to:

- Translate political phenomena into mathematical notation.
- Plot functions and interpret graphs.
- Solve problems with logarithms, summations & products.
- Perform vector and matrix arithmetic.
- Solve problems in vector and matrix algebra, including eigen structures.
- Find limits.
- Calculate and interpret derivatives (in one and several variables).
- Calculate and interpret integrals (in one and several variables).
- Count.
- Calculate and simulate to find marginal, conditional & posterior probabilities.
- Identify and apply the distribution functions of discrete and continuous random variables.
- Calculate descriptive statistics and moments of random variables.
- Compute bivariate measures of association.
- Use R and \LaTeX .

Reading

There are two required texts for this course:

- Gill, Jeff. 2006. *Essential Mathematics for Political and Social Research*. New York: Cambridge University Press. ISBN-13: 978-0521684033; ISBN-10: 052168403X
- Monogan, James E., III. 2015. *Political Analysis Using R*. New York: Springer. **Free download on campus:** <http://link.springer.com/book/10.1007/978-3-319-23446-5>

Students with Disabilities

Students with disabilities that have been certified by the UGA Disabilities Services office will be accommodated according to university policy. For more information, contact Disabilities Services at 706-542-8719.

Academic Integrity

Academic integrity is a core value of institutions of higher learning. All students, upon enrolling, must pledge: “I will be academically honest in all of my academic work and will not tolerate academic dishonesty of others.” It is your responsibility to avoid plagiarism, cheating, and dishonesty. The university policy on academic integrity is posted at:

<https://honesty.uga.edu>. To qualify the application of the policy in this course: tests should be your own work, papers should be your own work though you may ask others for suggestions, and studying and class preparation can (and should) be done with others provided every keystroke of the final copy is your own.

Course Requirements and Evaluation

Nearly every class will require you to read as well as solve problems, conduct analysis with software, or write ahead of time to prepare. I will distribute homework assignments one class ahead of time. With homework assignments, you are encouraged to work together. However, you need to turn in your own solution set, typed and legible, where each keystroke is your own. These assignments will be worth 4 points each and are due in person at the start of class. If you attend regularly and your class participation is average, then your score for “homework, attendance & participation” will be based on your total homework score. If your participation and attendance is particularly impressive or particularly poor, then this grade will be increased or decreased accordingly.

The midterm exam is a take-home test. For this exam, you must work on your own. You may consult notes, past solution sets, or textbooks, but you may not consult any other person through any medium. If you have a question, you may write to me (monogan@uga.edu), and if it is appropriate, I will send-out an anonymous version of your question and a reply to everyone. Exams also must be typed and legible. The midterm exam must be turned-in at the designated time on the due date, so plan your schedule appropriately. The final exam will be held in class at the designated exam time and thereby will be conducted with pen and paper.

For this exam, you are encouraged to bring a calculator and one 8.5" × 11" page with notes on the front and back.

No late work will be accepted on any assignment. Your final grade will be based on the sum of points earned from the following assignments:

Homework, attendance & participation	48 pts.
Midterm exam	26 pts.
Final exam	26 pts.

Grades are constructed to reflect the university standards posted at http://bulletin.uga.edu/Bulletin_Files/acad/Grades.html, which are summarized below. Grades will be based on how many points you earn according to the following distribution:

"Excellent"	A-=90-92 pts.	A=93-100 pts.	
"Good"	B-=80-82 pts.	B=83-86 pts.	B+=87-89 pts.
"Satisfactory"	C-=70-72 pts.	C=73-76 pts.	C+=77-79 pts.
"Passing"	D =60-69 pts.		
"Failure"	F =fewer than 60 pts.		

Auditing the Course

POLS 7012 is required of all Political Science and International Affairs graduate students, so if you are in one of these departments you must take this for credit. For all other students, course auditors are welcome in this class, provided there are enough students enrolled for credit. Please keep up with weekly reading and homework. No assignments will be graded, though. **To audit a course:** On **Athena**, choose the "Student" tab. From there choose the "Student Registration" menu. Register for this class, and then you should be given the options of Drop/Add/Audit/Withdraw. Choose "Audit." Please note that you must select audit status before the Drop/Add period ends for students or you will not be able to audit the course.

COURSE SCHEDULE

Aug. 19: Notation, Functions

Reading: Gill §1.1-1.6

Aug. 26: Introduction to \LaTeX

Due: Install working \LaTeX and R configurations

Sept. 2: NO CLASS, UNIVERSITY HOLIDAY

Sept. 9: Logs, Exponents, Summations

Reading: Gill §1.7-1.9 and Monogan chapter 1

Due: Problem set 1

Sept. 16: Vectors

Reading: Gill chapter 3 and Monogan chapter 2

Due: Problem set 2

Sept. 23: Matrix Algebra

Reading: Gill §4.1-4.6 and Monogan chapter 10

Due: Problem set 3

Sept. 30: Linear Algebra

Reading: Gill §4.7

Due: Problem set 4

Oct. 7: Matrix Methods for Linear Algebra & Eigen Structures (last topics for first exam)

Reading: Gill §4.8

Due: Problem set 5

Oct. 14: Limits

Reading: Gill §5.1-5.2 and Monogan chapter 3

Due: Problem set 6

Oct. 21: Derivatives

Reading: Gill §5.3-5.4

Due: FIRST EXAM

Oct. 28: Integration

Reading: Gill §5.5-5.7

Due: Problem set 7

Nov. 4: Multivariable Calculus and Vector Calculus

Reading: Gill chapter 6 & §4.9

Due: Problem set 8

Nov. 11: Counting, Probability

Reading: Gill §7.1-7.5

Due: Problem set 9

Nov. 18: Bayes Rule, Independence, Odds

Reading: Gill §7.6-7.8

Due: Problem set 10

Nov. 25: Random Variables, Discrete Distributions, Continuous Distributions

Reading: Gill §8.1-8.3 and Monogan chapter 4

Due: Problem set 11

Dec. 2: Distribution Properties, Moments, Covariance, Correlation

Reading: Gill §8.4-8.10 and Monogan chapter 5

Due: Problem set 12

Dec. 11 (Wed.): FINAL EXAMINATION, 3:30-6:30pm