POS 6737 | Political Data Analysis

Class Number: 15116

Delivery Method: Primarily Classroom
T | Period 2-4 (08.30 AM-11.30 AM) Rae O. Weimer Hall 2050

Instructor Information

Name: Andrew Rosenberg

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Office Hours
Tuesdays 11:45 a.m.–12:30 p.m.

Wednesdays 12:30–2:00 p.m., or by appointment.

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Office Hours
TBD

Office Location

Rosenberg: 333 Anderson Hall

Course Details

Catalog Description: Introduction to quantitative methods and techniques.
Credit Hours: 3
Course Fees: $0.00

Additional Course Description

Political Science 6737 is an introduction to probability and statistics targeted toward political science PhD students. A primary purpose of the course is to build a strong foundation for regression, generalized linear models, and causal inference. To accomplish this goal, we will study the basics of probability theory, properties of random variables, asymptotic approximations, methods for developing and evaluating statistical estimators, and hypothesis testing. In addition, the course will provide a hands-on introduction to statistical computing.

Required Materials

The instructor has stated that there are no items required or recommended for this section.

A Note on Materials

We have no required books to purchase. I will provide resources in class.

Course Goals and Objectives

POS 6737 is designed to build, from the ground up, the statistical foundation that quantitative political science rests on. Specifically, the course aims to:

- Introduce students to the core ideas of probability theory---random variables, distributions, expectation, and variance---as the language for reasoning about uncertainty.

- Develop students' understanding of statistical inference: sampling distributions, the central limit theorem, estimation, and hypothesis testing.

- Introduce ordinary least squares regression as the workhorse of empirical political science.

- Familiarize students with the basics of causal inference, including the potential-outcomes framework and the conditions under which a regression coefficient can be read causally.

- Develop students' practical skills in statistical computing with R, emphasizing reproducible analysis and simulation.

- Prepare students to move on to advanced coursework in regression, generalized linear models, and causal inference, and to critically evaluate quantitative work in the discipline.

Expectations and Student Learning Outcomes

By the end of the course, students will be able to:

- Apply basic probability axioms and rules and work with the moments and common families of discrete and continuous random variables.
- Use summary statistics and graphics to conduct exploratory data analysis.
- Calculate probabilities and derive marginal and conditional distributions.
- Conduct hypothesis tests and construct confidence intervals.
- Derive, fit, interpret, and diagnose linear regression models (bivariate and multiple OLS).
- Understand the fundamental problem of causal inference and when a regression coefficient can be read causally.
- Read data into R, clean it, write functions, debug code, run simulations, and present results in R Markdown.

Methods of Evaluation

Component	Weight
Problem Sets	20%
Midterm Exam	35%
Final Exam	45%
Total	100%

Grading Scale

Letter grade and percentage

Letter	Percentage Value
A	94 - 100%
A -	90 - 93%
B +	87 - 89%
B	83 - 86%
B -	80 - 82%
C +	77 - 79%

Letter	Percentage Value
C	73 - 76%
C -	70 - 72%
D +	67 - 69%
D	63 - 66%
D -	60 - 62%
E	59% and below

Course Schedule

Main book: Andrew S. Rosenberg, Probability, Statistics, and Regression for Political Scientists (2025). Provided as a PDF on Canvas. Read the assigned chapter before each class. The book ships with a data package (the data/ folder on Canvas) containing every dataset used in the chapters and problem sets, with a README data dictionary.

Week	Topic	Chapters
1	Introduction; the math you actually need	Ch 1, Ch 3 (+ App. A)
2	Describing & visualizing data	Ch 2
3	Probability	Ch 4
4	Random variables; joint/marginal/conditional distributions	Ch 5
5	Expectation, variance, covariance; distributions & the normal	Ch 6
6	Sampling distributions & the CLT	Ch 7
7	Midterm (foundations → CLT)	-----
8	Hypothesis testing	Ch 9
9	Estimation: point, MLE, confidence intervals	Ch 10
10	Logic of regression + bivariate OLS	Ch 11-12
11	Inference in regression	Ch 13
12	Multiple regression	Ch 14 (+ App. B)
13	Diagnostics & threats to inference	Ch 15
14	No Class (Thanksgiving)	-----
15	Causality and a first look at binary DVs	Ch 16-17

Schedule of Assignments

Due Dates	Assignments	Type of Assignment	Points
9/1/26	Problem Set 1	Problem Set	40

Due Dates	Assignments	Type of Assignment	Points
9/8/26	Problem Set 2	Problem Set	40
9/15/26	Problem Set 3	Problem Set	40
9/22/26	Problem Set 4	Problem Set	40
9/29/26	Problem Set 5	Problem Set	40
10/6/26	Problem Set 6	Problem Set	40
10/13/26	Problem Set 7	Problem Set	40
10/27/26	Problem Set 8	Problem Set	40
11/3/26	Problem Set 9	Problem Set	40
11/10/26	Problem Set 10	Problem Set	40
11/17/26	Problem Set 11	Problem Set	40
12/1/26	Problem Set 12	Problem Set	40

University Policies and Resources

Information about grading policies, support for students with disabilities, course evaluations, the Honor Code, and other course policies and campus resources can be found on the Syllabus Policies page.

Attendance Policy

Excused and Unexcused Absences

Students may only participate in classes if they are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors.

Students are responsible for satisfying all academic objectives as defined by the instructor. Absences count from the first-class meeting.

Acceptable reasons for absence from or failure to engage in class include illness; Title IX-related situations; serious accidents or emergencies affecting the student, their roommates, or their family; special curricular requirements (e.g., judging trips, field trips, professional conferences); military obligation; severe weather conditions that prevent class participation; religious holidays; participation in official university activities (e.g., music performances, athletic competition, debate); and court-imposed legal obligations (e.g., jury duty or subpoena). Other reasons (e.g., a job interview or club activity) may be deemed acceptable if approved by the instructor.

For all planned absences, a student in a situation that allows an excused absence from a class, or any required class activity must inform the instructor as early as possible prior to the class. For all unplanned absences because of accidents or emergency situations, students should contact their instructor as soon as conditions permit.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during absence from class or inability to engage in class activities because of the reasons outlined above.

If a student does not participate in at least one of the first two class meetings of a course or laboratory in which they are registered, and they have not contacted the department to indicate their intent, the student can be dropped from the course. Students must not assume that they will be dropped, however. The department will notify students if they have been dropped from a course or laboratory.

The university recognizes the right of the instructor to make attendance mandatory and require documentation for absences (except for religious holidays), missed work, or inability to fully engage in class. After due warning, an instructor can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Religious Holidays Guidelines

At the University of Florida, students and faculty work together to allow students the opportunity to observe the holy days of their faith. A student should inform the faculty member of the religious observances of their faith that will conflict with class attendance, with tests or examinations, or with other class activities prior to the class or occurrence of that test or activity. The faculty member is then obligated to accommodate that particular student's religious observances. Because students represent a myriad of cultures and many faiths, the University of Florida is not able to assure that scheduled academic activities do not conflict with the holy days of all religious groups. Accordingly, individual students should make their need for an excused absence known in advance of the scheduled activities.

The Florida Board of Education and state law govern university policy regarding observance of religious holidays.

Guidelines

- Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith.
- Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.
- Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

If a faculty member is informed of or is aware that a significant number of students are likely to be absent from class because of a religious observance, the faculty member should not schedule a major exam or other academic event at that time.

A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence. Furthermore, a student who believes that they have been unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

Absence due to Illness

A student who is absent from class or any required class-related activity because of illness should contact their instructor, if feasible, as early as possible prior to the missed

class or activity.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during an excused absence.

Students should contact their college by the deadline to drop a course for medical reasons. Students can petition the Dean of Students Office to drop a course for medical reasons. The university's policy regarding medical excuse from classes is maintained by the Student Health Care Center.

Twelve-Day Rule

Students who participate in university-sponsored athletic or scholarly activities are permitted to be absent 12 scholastic days per semester without penalty. A scholastic day is any day on which regular class work is scheduled as defined in the approved university calendar. More Info

The student or student's advisor must notify the instructor as early as possible prior to the anticipated absence to allow ample time for accommodations. Instructors must be flexible and not penalize students when re-scheduling during-term and final exams, class assignments, and other required activities and must follow the UF Attendance Policy herein and UF Examination Policies. As noted in the UF Examination Policies, during-term exams should be re-scheduled no later than before the end of the semester, while final exams no later than 90 days after the originally scheduled exam time. However, instructors are encouraged to re-schedule final and during-term exams, assignments, and other activities as soon as possible after the last day of the absence and must not penalize the student in any way. More Info

A group's schedule that requires absence of more than 12 scholastic days should be adjusted so that no student is absent from campus more than 12 scholastic days. Students who previously have been warned in writing by their instructor about the impact of absences on their individual class performance should not incur additional absences, even if they have not been absent 12 scholastic days. The student is responsible to maintain satisfactory academic performance and attendance.

Course Policies and Resources

Collaboration: You are encouraged to work with classmates on the problem sets, and forming a study group is one of the best things you can do in this course. But you must

write your own solutions, including your own code. Try every problem on your own before consulting others; the exams will be difficult if you have relied on classmates to get through the problem sets.

Use of AI: Generative AI tools (ChatGPT, Claude, GitHub Copilot, and the like) are now part of how people write code and analyze data, and you will use them in your career. This course does not pretend otherwise. It has one non-negotiable aim: you must be able to do statistics and computing yourself. The policy follows from a single principle: use AI to learn, never as a substitute for learning.

In practice:

- Allowed, the way you would use a tutor or a search engine: ask an AI to explain a concept, interpret an R error message, or remind you of a function's syntax. Then write the answer yourself and make sure you understand it.
- Not allowed: submitting AI-generated code, prose, or solutions that you could not reproduce and explain on your own. If you hand in an answer you cannot account for, you have misused the tool.
- If you lean on AI for part of a problem set, add a sentence at the top saying how you used it, the same courtesy you would give any source.

The structure of the course makes this mostly self-enforcing. Problem sets are low-stakes; they exist so that you learn. The exams are in-class, closed-note, worth most of your grade, and built from the same skills the problem sets practice. Let AI do your problem sets and you will reach the exams unable to do the work yourself. Use it as a study aid, not a ghostwriter.

Submitting work generated by an outside "Entity," including generative AI, as your own beyond what this policy allows is a violation of the UF Student Conduct Code.

Computing and software: We use R (free; r-project.org) and RStudio (free; posit.co) throughout. Bring a laptop to class so you can follow along and participate. The first problem set walks you through installation; contact me early if you have trouble getting set up. All datasets used in the course are provided in the data/ folder on Canvas, with a README data dictionary.

Communication and email: Email me with pressing questions, but do not expect immediate replies---I often do not check email in the evenings or on weekends. For anything substantive, office hours are better than email.

Office hours: I hold office hours each week and am happy to meet outside them by

appointment. Use the Calendly link at the top of this syllabus to book a time. Office hours are the time I set aside to be fully available to you; please use them, especially when you are stuck.

Getting help: Statistics is hard, and nearly everyone finds this course challenging — it is not just you. Your best resources are: coming to class prepared and participating; the optional TA recitation; office hours; your classmates and study group; and the many free R resources online. If you put in the time and tell me when you are struggling, I can help.

Late and Make Up Work Policy

Problem sets: Problem sets are due at the start of class on the date listed in the schedule and must be submitted as a knitted R Markdown document (PDF or Word) plus the .Rmd file. Late problem sets are not accepted. To accommodate ordinary scheduling pressures, your two lowest problem-set scores are dropped from the final grade.

Exams: The midterm and final are in-class, closed-note exams given on the scheduled dates. Make-up exams are arranged only for an excused absence as defined by UF policy.

Excused absences and extensions: Late submission of an assignment, or a make-up exam, will be permitted only when the absence qualifies as excused under University policy: a documented medical, family, or similar serious emergency; observance of a religious holy day (which requires written notice to the instructor at least 14 days before the due date); or a properly documented University-sponsored activity. Incomplete assignments or exams in all other cases receive a score of zero. If you know in advance that you will miss a deadline or an exam, contact me as soon as possible to arrange an alternative.

Classroom Behavior

This is a graduate seminar, and I expect you to treat it as a professional setting. Come prepared: do the reading before class and be ready to participate. The classroom is the best place to exchange ideas, ask questions, and work through difficult material with your classmates, and it works only if everyone engages.

Treat your classmates and instructor with respect. Statistical and substantive disagreement is welcome and expected; personal disrespect is not. Make space for others to speak, and assume good faith when ideas are challenged.

Other Resources

- Sean Gailmard, Statistical Modeling and Inference for Social Science (Cambridge University Press, 2014). Optional second presentation of the probability and inference material.
- fasteR: Fast Lane to Learning R (free, online): https://github.com/matloff/fasteR — short, self-paced R lessons
- Hadley Wickham & Garrett Grolemund, R for Data Science (2nd ed., free online): https://r4ds.hadley.nz/ — optional deeper R reference.
- Imai, Quantitative Social Science: An Introduction (Princeton, 2017).
- Gelman, Hill & Vehtari, Regression and Other Stories (Cambridge, 2020). The modern applied-regression book
- Cunningham, Causal Inference: The Mixtape (Yale, 2021). Free online (mixtape.scunning.com). Ideal optional reading for the Ch. 16 causality material.
- Healy, Data Visualization: A Practical Introduction (Princeton). Free online (socviz.co).
- Wasserman, All of Statistics (Springer). Terse and rigorous