PLSC 30500: Introduction to Quantitative Social Science

FALL 2025

Meeting Times and Locations	Lecture:	MW 10:30 AM - 12:20 PM, Pick 506
	Lab:	F 1:30 - 2:20 PM, Cobb 303

Professor

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Course Description and Objectives

Over the last half century, political scientists have come to rely increasingly on quantitative methods. This trend has occurred in all empirical subfields and contiues to rapidly advance. Whether you aim to develop your own quantitative research program or merely keep up with the literature in your field, statistical literacy is now just as important as theoretical knowledge. This course introduces skills and concepts that will help you understand and produce quantitative social science research. By the end of the course, you should understand:

- Basic foundations of probability and statistics
- Challenges and common approaches to the problem of estimation
- How to conduct statistical inference and produce measures of uncertainty
- How to translate the results of statistical tests into substantive conclusions about the political and social world
- How to use the R programming language for statistical problems

This is the first course in the Political Science department's quantitative methods sequence. It is followed by Inference in the winter and Estimation in the spring. We will avoid spending lots of time on topics that will be covered adequately in later courses. Instead, we will prioritize gaining a solid understanding of foundational concepts. If we need to slow down and cover less material in order to achieve this, we will do so.

If you enter the course with no prior knowledge of statistics, my advice is to study regularly, use your colleagues as resources, and ask questions. It can be easy to fall behind and difficult to catch up. If you have a background in statistics, try not to be lulled into a sense of complacency. Take advantage of this opportunity to reinforce your existing knowledge. Eventually, you will encounter more advanced topics—either in this or future courses—and you do not want to be caught off-guard.

Prerequisites

Students are assumed to have some previous exposure to R programming, probability, and at least a surface-level treatment of common mathematical operations. The department's Math Camp is more than suitable to satisfy these requirements. If you did not participate in Math Camp, the instructional team can provide materials to review.

Textbooks

We will draw from three textbooks. Aronow and Miller is available online from the library, but I recommend a paper copy to facilitate note-taking. Blitzstein and Hwang and Blackwell are both freely available online:

P. M. Aronow and Benjamin T. Miller. *Foundations of Agnostic Statistics*. New York: Cambridge University Press (2019).

Joseph K. Blitzstein and Jessica Hwang. *Introduction to Probability*. Boca Raton, FL: CRC Press (2019). https://drive.google.com/file/d/1VmkAAGOYCTORq1wxSQqy255qLJjTNvBI/edit.

Matthew Blackwell. *A User's Guide to Statistical Inference and Regression*. Boca Raton, FL: CRC Press (forthcoming). https://mattblackwell.github.io/gov2002-book/.

You should complete the Aronow and Miller readings every week. Their treatment of the material tends to be higher-level, with more mathematical notation and fewer examples. The Blitzstein and Hwang and Blackwell readings can be considered supplementary. To the extent you need them, you can refer to those texts for more accessible, narrative-style explanations.

Software

We will use the R computer programming language extensively this semester. R has many benefits over other statistical software packages:

- It is the primary tool for statistical computing in private-sector, government, and academic settings.
- It is open-source, which means it is free for anyone to use and contribute to, and users can always see how each function works.
- It is cross-platform, meaning you can run it on almost any operating system.
- It is more powerful and versatile than other software packages.

We will write and edit our R code using a user interface called RStudio. While R code can be written in any plain text editor, RStudio provides a number of useful features in a user-friendly environment.

You must have both R and RStudio installed on your computer when you show up for your first lab meeting. Follow the two-step process on this website to download R and RStudio: https://posit.co/download/rstudio-desktop/.

Writing in LaTeXis an indispensable skill for social scientists, especially those who use mathematical notation or embed many tables and figures into their writing. To more easily create documents that combine R code and prose, we will compile assignments using Sweave (https://support.posit.co/hc/en-us/articles/200552056-Using-Sweave-and-knitr). Sweave requires you to have a LaTeXdistribution installed on your machine: (https://www.latex-project.org/get/). You should familiarize yourself with creating and compiling Sweave documents before your first lab meeting.

Grading and Logistics

Graduate school is about learning and developing skills; getting good grades is not the objective. Nevertheless, course grades will be based on the following:

- **Lab assignments (20%):** Most lab meetings will consist of you working individually or in small groups to complete an R script applying concepts from lecture and readings. Even though you will work in groups, you must submit your own assignment. Lab meetings are always on Friday and the assignment will be due by the start of Monday lecture the next week. Assignments will be graded on completion.
- **Problem sets (40%):** There will be four problem sets throughout the semester, always due by 11:59 PM on Fridays. You may collaborate with other students if you wish, but you must submit your own assignment documenting the students with whom you collaborated, if any. Assignments will be graded on a scale of 0-3, where 0 indicates you did not turn in the problem set and 3 indicates complete mastery of the material.
- **Midterm and final exams (40%)**: We will administer midterm and final exams that will be due at 11:59 PM on October 31 and December 12, respectively. You may not collaborate with other students or use generative AI tools. The exams will be graded on the degree to which your written responses and code are accurate and thorough. If you believe you received an incorrect grade on an exam, you may submit a written appeal within 48 hours of receiving your grade. If I decide there is merit to the appeal, I will regrade the entire exam. The resulting grade will be final.

The teaching assistant (TA) will grade all assignments. Following a curve, a final percentage grade x will translate into letter grades as follows:

- $90 \leq x \rightarrow$ A
- $80 \leq x < 90 \rightarrow$ B
- $70 \leq x < 80 \rightarrow$ C
- $60 \leq x < 70 \rightarrow$ D
- $x < 60 \rightarrow$ F

Course Schedule

The schedule below is subject to change depending on the speed at which we progress through the material. Abbreviations: Aronow and Miller (AM), Blitzstein and Hwang (BH), Blackwell (BW).

Weeks	Dates	Modules and Assignments	Readings
1	9/29 - 10/3	Introduction and Probability	AM 1; BH 1-2
2	10/6 - 10/10	Describing Distributions	AM 2; BH 3 (skip 3.4, 3.9), 4.1, 4.2, 4.4-4.6, 5 (skip 5.5, 5.6), 7 (skip 7.4), 9.1, 9.2, 9.5
	Due 10/10	**Problem Set 1**	
3	10/13 - 10/17	Describing Distributions (continued)	AM 2; BH 3 (skip 3.4, 3.9), 4.1, 4.2, 4.4-4.6, 5 (skip 5.5, 5.6), 7 (skip 7.4), 9.1, 9.2, 9.5
4	10/20 - 10/24	Estimation and Inference	AM 3.1-3.4; BH 10.1-10.3 (skip 10.1.1); BW 1-4
	Due 10/24	**Problem Set 2**	
5	10/27 - 10/31	Estimation and Inference (continued)	AM 3.1-3.4; BH 10.1-10.3 (skip 10.1.1); BW 1-4
	Due 10/31	**Midterm Exam**	
6	11/3 - 11/7	Estimation and Inference (continued)	AM 3.1-3.4; BH 10.1-10.3 (skip 10.1.1); BW 1-4
7	11/10 - 11/14	Linear Regression	AM 4 (skip 4.3.5, 4.3.6); BW 5-7 (skip 6.6-6.8)
	Due 11/14	**Problem Set 3**	
8	11/17 - 11/21	Linear Regression (continued)	AM 4 (skip 4.3.5, 4.3.6); BW 5-7 (skip 6.6-6.8)
	11/24 - 11/28	**Thanksgiving Break**	
9	12/1 - 12/5	Linear Regression (continued) and Catch-Up	AM 4 (skip 4.3.5, 4.3.6); BW 5-7 (skip 6.6-6.8)
	Due 12/5	**Problem Set 4**	
	Due 12/12	**Final Exam**	

Communication

StackOverflow

We will use our course's private StackOverflow for asking and answering questions about course material or logistics. Rather than emailing questions to the instructional team, please

first check whether a similar question has already been answered on StackOverflow. If not, post your question on StackOverflow so other students can also benefit from the discussion. You will receive an invitation to join the private StackOverflow team, and you can access the team at: https://stackoverflowteams.com/c/uchicagopolmeth. If you are asking a question about coding, it is good practice to provide a minimal working example (MWE) to help others understand your problem. Good examples of how to create an MWE can be found at https://stackoverflow.com/questions/5963269/how-to-make-a-great-r-reproducible-example and https://stackoverflow.com/help/minimal-reproducible-example.

Communication with the Instructional Team

We are always happy to meet with you during our scheduled office hours or outside those hours if they do not work with your schedule. TA office hours are generally first-come, first-served. This is also the default for my office hours, and I encourage you to attend with colleagues if you have similar questions. If you prefer a one-on-one meeting, the best option is to sign up for one or two time slots using the link at the top of this document. We are here to facilitate your learning, but you are ultimately the only one who can be responsible for your training. Be proactive and let us know how we can assist you.

Communication with Other Students

Learning is a collaborative endeavor, and we all bring unique backgrounds and experiences to the course material. Treat your colleagues how you want to be treated. You will have the option to collaborate on labs and problem sets; use these opportunities to learn from each other. I encourage you to form study groups and discuss material amongst yourselves if you do not understand it.

Academic Integrity

Familiarize yourself with the university's policies on academic dishonesty and plagiarism: https://studentmanual.uchicago.edu/academic-policies/academic-honesty-plagiarism/. As with most other things in this profession, you should give credit to others when you use their language, materials, or findings. There could be serious consequences for committing plagiarism, including failing the course and being asked to leave the university, not to mention reputational and career implications.

Generative Artificial Intelligence

Generative artificial intelligence (AI)—such as OpenAI's ChatGPT or Google's Gemini—is gradually reshaping human-computer interaction. These are valuable tools for understanding and conducting data analysis and for producing computer code. However, generative AI also presents thorny issues for education: it often generates incorrect content and makes it easy to breach academic integrity.

Use of generative AI in this course is permitted on labs and problem sets, but not on the midterm or final exams. I further encourage you to use these tools as a tutor for concepts that you are

confused about. But beware: generative AI models frequently make mistakes, and using them as a crutch will hinder your own ability to learn the material. I reserve the right to revoke this privilege at any time if I suspect it is being abused.

Attendance, Late Work, and Accommodations

This is a PhD-level course; you are expected to come to class and complete assignments on time. If you need to be absent from class or extenuating circumstances prevent you from completing assignments, please alert me or the TA ahead of time. We will not accept late assignments without prior notice.

Please reach out to the instructional team directly if you would like to request accommodations for the course to better facilitate your learning. Student Disability Services (disabilities.uchicago.edu) is also available to provide resources and support, and may provide approval for specific academic accommodations. Informing us in a timely manner will help us to ensure accommodations are met and we are able to implement an appropriate assessment of your learning.