



湖北工业大学
HUBEI UNIVERSITY OF TECHNOLOGY

Course Title	Quantitative Methods for Political Science
Course Code	POLS 2721
Semester	Summer 2025
Course Length	5 Weeks, 60 Contact Hours
Credits	4
Instructor	TBA
Office	TBA
Email	TBA
Prerequisite	N/A

Course Description:

This course introduces students to quantitative methods in political science, focusing on the application of statistical techniques to political data. The course will cover foundational concepts in research design, data analysis, and statistical inference, with an emphasis on linear regression models. In addition, you will learn how to apply basic quantitative methods to political questions and acquire basic knowledge of the statistical software program R.

The main goals of this course are to develop sound critical judgment about quantitative studies of political problems, to interpret quantitative analyses in published work, to understand the logic of statistical inference, and to recognize and understand basic regression models. It provides the skills necessary to conduct your own quantitative analyses and teaches how to do so using R.

Course Goals:

Students who successfully complete this course will demonstrate competency in the following general education core goals:

- **Critical thinking skills** – Students will engage in creative and/or innovative thinking, and/or inquiry, analysis, evaluation, synthesis of information, organizing concepts, and constructing solutions.
- **Communication skills** – Students will demonstrate effective written, oral, and visual communication.
- **Teamwork** – Students will demonstrate the ability to work effectively with others to support a shared purpose or goal and consider different points of view.
- **Social responsibility** – Students will demonstrate intercultural competency and civic knowledge by engaging effectively in local, regional, national, and global communities.

Student Learning Outcomes:

Upon completion of this course, students will be able to:

- understand and operationalize abstract political science concepts for empirical testing;
- differentiate between types of variables (nominal, ordinal, interval) and apply appropriate statistical techniques;
- design and implement a research project using quantitative methods;
- interpret and critique quantitative analyses in published political science research;
- use R for data analysis, visualization, and statistical modeling;
- understand and apply advanced statistical techniques, including Bayesian inference and logistic regression.

Textbooks/Supplies/Materials Requirements:**Textbooks:**

- Kellstedt, Paul M., and Guy D. Whitten. 2013. *The Fundamentals of Political Science Research*. 2nd ed. New York, NY: Cambridge University Press.
- Philip H. Pollock, and Barry Clayton Edwards. 2020. *The Essentials of Political Analysis (6th ed.)*. CQ Press.
- Philip H. Pollock, and Barry Clayton Edwards. 2018. *An R Companion to Political Analysis (2nd ed.)*. CQ Press.

Software:

- R and RStudio (free downloads available)
- GitHub for version control and collaboration

Course Requirements:**Attendance and Participation**

Regular attendance and active participation in lectures and lab sessions are essential for success in this course. Participation includes asking questions, contributing to discussions, and engaging with peers during group activities. Attendance will be recorded at the beginning of each lecture and lab session, and participation will contribute to 5% of the final grade.

Problem Sets

Students will complete five problem sets throughout the semester, accounting for 15% of the final grade. These problem sets will focus on data analysis and interpretation using R, combining theoretical questions with practical coding exercises. Each problem set will be assessed based on correctness, clarity, and the quality of the R code. Assignments must be submitted at the start of the lab session on the specified due date, with a late penalty of 10% per day.

Lab Performance

Lab sessions provide hands-on experience with R and statistical techniques. Each session will include a short quiz or practical exercise to assess comprehension. Lab participation and performance will be evaluated based on attendance, completion of in-lab quizzes/exercises, and the quality of work produced.

Midterm Exam

This closed-book exam will cover the first half of the course material and will include multiple-choice questions, short-answer questions, and a practical component requiring students to analyze a dataset using R.

Research Paper

Students will also be required to submit a research paper, accounting for 20% of the final grade. This 2000-word paper ($\pm 10\%$) will apply quantitative methods to a political science question, incorporating a literature review, theoretical framework, and empirical analysis. Students will present their research findings during the final week of the course.

Final Exam

The final exam, worth 25% of the final grade, will be a comprehensive assessment covering all course material. Emphasizing the interpretation and application of statistical methods, the exam will include both theoretical questions and practical data analysis tasks.

Assessments: Activity	Percent Contribution
Attendance and Participation	5%
Problem Sets	15%
Lab Performance	20%
Midterm Exam	15%
Final Essay	20%
Final Exam	25%

Grading:

Final grades will be based on the sum of all possible course points as noted above.

Percentage of available points	Grade
90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
<60	F

Course Schedule:

The schedule of activities is subject to change at the reasonable discretion of the instructor. Minor changes will be announced in class, and major ones provided in writing.

POLS 2721 Schedule		
Lecture	Topics	Additional Readings & Activities
L1	Introduction to Quantitative Methods Course Overview and Introduction to R	Clarke, Kevin A. 2007. "The Necessity of Being Comparative: Theory Confirmation in Quantitative Political Science." <i>Comparative Political Studies</i> 40(7): 886–908
L2	The Scientific Method in Political Science	Clarke, Kevin A., and David M. Primo. 2007. "Modernizing Political Science: A Model-Based Approach." <i>Perspectives</i>

L3	Literature Reviews and Theoretical Frameworks	<i>on Politics</i> 5(4): 741-53 Knopf, Jeffrey W. 2006. "Doing a Literature Review." <i>PS: Political Science and Politics</i> 39(1): 127–32.
L4	Concepts and Measurement Defining and Measuring Concepts Operationalization and Validity	Carmines, Edward G., and Richard A. Zaller. 1979. <i>Reliability and Validity Assessment</i> . Newbury Park, CA: Sage Publications.
L5	Data and Variables Types of Variables (Nominal, Ordinal, Interval)	<i>Kellstedt</i> . Ch.5
L6	Measuring and Describing Variables (Dummy variable, Likert Item, Mode/Median/Mean)	Lab Session <i>Kellstedt</i> . Ch.5
L7	Hypotheses and Comparisons (Independent, Dependent) Variable, (Positive, Negative, Zero, Curvilinear) Relationship, Cross-Tabulation, Mean Comparison)	<i>Pollock</i> , Ch. 3
L8	Data Collection and Descriptive Statistics	Lab Session Problem Set 1 Due
L9	Probability and Distributions Basic Probability Theory	Lynch, Scott M. 2013. <i>Using Statistics in Social Research: A Concise Approach</i> New York, NY: Springer (pp. 57-82)
L10	Probability Distributions (Binomial, Normal)	Lab Session
L11	Research Design, Control, and Comparison Research Questions and Hypotheses	<i>Kellstedt</i> . Ch.2
L12	Statistical Inference Sampling Methods and Sampling Distributions Population, Population Parameter, (Random) Sample, Census	Lab Session <i>Kellstedt</i> . Ch.6
L13	Random Sampling Error, Central Limit Theorem Confidence Intervals and Hypothesis Testing	Lab Session <i>Kellstedt</i> . Ch.6 Problem Set 2 Due
L14	Midterm Exam	/
L15	Correlation and Linear Regression	<i>Pollock</i> , Ch. 8
L16	Linear Regression Basics Introduction to Linear Regression	Lab Session
L17	Regression Diagnostics Model Assumptions and Diagnostics	John Fox. 2008. <i>Applied Regression Analysis</i> . Ch. 11-13.2.1
L18	Multicollinearity and Heteroskedasticity	<i>Pollock</i> , Ch. 8
L19	Causal Inference Causality and Control Variables	Lab Session
L20	Experimental vs. Observational Studies	Problem Set 3 Due
L21	Interaction Effects Interaction Terms in Regression	<i>Pollock</i> , Ch. 8
L22	Logistic Regression Binary Outcomes and Logistic Regression Odds Ratios and Model Interpretation	Lab Session Problem Set 4 Due
L23	Bayesian Inference Introduction to Bayesian Statistics Bayesian vs. Frequentist Approaches	Western, Bruce, and Simon Jackman. 1994. "Bayesian Inference for Comparative Research." <i>American Political Science Review</i> 88(2): 412–23
L24	Replication	Herndon, Thomas, Michael Ash, and

Robert Pollin. 2014. "Does High Public Debt Consistently Stifle Economic Growth? A Critique of Reinhart and Rogoff." *Cambridge Journal of Economics* 38(2): 257–79.

Problem Set 5 Due

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L25 **Research Paper Presentations
Final Exam**

Accommodation Statement

Academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow.

Academic Integrity Statement

Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in coursework may receive a reduced or failing grade for the work in question and/or for the course.

Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Other Items:

Attendance and Expectations

All students are required to attend every class, except in cases of illness, serious family concerns, or other major problems. We expect that students will arrive on time, be prepared to listen and participate as appropriate, and stay for the duration of a meeting rather than drift in or out casually. In short, we anticipate that students will show professors and fellow students maximum consideration by minimizing the disturbances that cause interruptions in the learning process. This means that punctuality is a must, that cellular phones be turned off, and that courtesy is the guiding principle in all exchanges among students and faculty. You will be responsible for the materials and ideas presented in the lecture.

Assignment Due Dates

All written assignments must be turned in at the time specified. Late assignments will not be accepted unless prior information has been obtained from the instructor. If you believe you have extenuating circumstances, please contact the instructor as soon as possible.

Make-Up Work

The instructor will not provide students with class information or make-up assignments/quizzes/exams missed due to an unexcused absence. Absences will be excused and assignments/quizzes/exams may be made up only with written documentation of an authorized absence. Every effort should be made to avoid scheduling appointments during class. An excused student is responsible for requesting any missed information from the instructor and setting up any necessary appointments outside of class.

Access, Special Needs and Disabilities

Please notify the instructor at the start of the semester if you have any documented disabilities, a medical issue, or any special circumstances that require attention, and the school will be happy to assist.