

POL 2507
Multiple Regression Analysis for Political Scientists
WINTER 2025

PREREQUISITE: POL 2504 or equivalent.

Instructor: Dr. Mark Nieman, mark.nieman@utoronto.ca

Time and Location: Tuesday 12-2 pm, see Acorn/Quercus

Student Hours: M 12–2pm, Sidney Smith 6026B

Overview and Objectives

The course provides students with a rigorous foundation in understanding multiple regression, its assumptions, diagnostics, and interpretation. Emphasis is given to acquiring rigorous theoretical foundations, which are necessary to learn and apply state-of-the-art quantitative tools used in the discipline. Along with a mathematical introduction, the course also covers their application using statistical software. Assessments are done via regular homework assignments, including computer/coding components. Assessments highlight the basic theoretical concepts in the context of both real-world and simulated data.

Learning Outcomes

Upon successful completion of this course, students should be able to:

- Translate political phenomena into mathematical notation.
- Understand theoretical assumptions of regression analysis.
- Specify and estimate appropriate regression models to test substantive hypotheses.
- Interpret model estimates.
- Diagnose and address violations of model assumptions where possible.
- Use R to import, manage and describe data, implement models, conduct diagnostics and sensitivity analysis, and produce publication-quality tables and figures.
- Take the next course in the methods sequence, POL 2519: Categorical Dependent Variables & Panel Data.

Required Materials and Software

- Wooldridge, Jeffrey M. Introductory Econometrics: A Modern Approach, 6e. (available on Quercus)
- R (latest version) <https://www.r-project.org/>
- RStudio (latest version) <https://rstudio.com/products/rstudio/download/>
- R and RStudio frequently put out new versions; we will keep up by periodically checking and updating our software (to avoid various errors and inconsistencies).

Grading Scale

Final grades are assigned in accordance with the University grading scale.

Requirements

Grades are based on homework assignments, and classroom participation.

- **Homework Assignments:** 80%

There is a total of 5 graded homework assignments (equally weighted). **No late assignments will be accepted, unless agreed on prior to the deadline.** The only exceptions/arrangements will be made for cases of extreme adversities.

Students can choose to complete these assignments on their own or work together in small groups of up to 3 students. Assignments completed in groups must clearly list the names of each student in the group (each student can submit a group assignment individually, or a designated group member may submit the assignment for the group). All group members will receive the same grade. Whether a student completes an assignment individually or as a part of the group, they are responsible for understanding every part of the answer they provided. **In the case where there is a substantial disconnect between a student's performance on homeworks and their in-class participation, the instructor will schedule an oral assessment, during which the student will be asked to explain some of the answers given in homeworks.**

Students have an option to re-submit **one** assignment **within one week after the assignment was graded.** Students can only re-submit an assignment that received a grade lower than an "A-". All assignments must be re-submitted via email to the instructor with a short description of how the assignment has been improved. This option is not available for missed assignments or those that received a grade of 0.

Deadlines:

- * Homework 1–Friday, Jan. 24, 5 pm.
- * Homework 2–Friday, Feb. 7, 5 pm.
- * Homework 3–Friday, Feb. 28, 5 pm.
- * Homework 4–Friday, Mar. 14, 5 pm.
- * Homework 5–Friday, Apr. 4, 5 pm.

- **Classroom Participation:** 20%

Classroom contribution is dependent on a student's attendance, positive and thoughtful contribution to discussion, and regular short pass/no pass in-class problem sets.

Course Policies

Student Responsibilities in the Learning Process: Students are expected to complete all required readings on a topic prior to completing that topic's assessment and complete all assessments on time. This means accessing the materials with sufficient time to complete assessments prior to deadlines. In the event that a student has questions concerning the material, they should formulate specific questions to ask via office hours or email with sufficient time for a response prior to assessment deadlines (i.e. questions should be sent at least 24 hours prior to a deadline, excluding weekends).

Classroom Conduct: Students are expected to participate in class in a thoughtful and respectful manner while in the pursuit of knowledge accumulation. Generally, this means engaging with one another's ideas and treating others as one would like to be treated, as well as *not* treating others how one would *not* like to be treated. Please see university policies on freedom of speech and discrimination and harassment.

Accommodations: Please discuss any special needs with the instructor start of the semester, for example to request reasonable accommodations if an academic requirement conflicts with religious practices and/or observances. Those seeking accommodations based on disabilities should complete the appropriate documentation with Student Life Programs and Services.

Academic Misconduct: All acts of dishonesty in any work constitute academic misconduct; please see the University's guidelines—including ways to avoid inadvertent misconduct—and rules of procedures regarding misconduct. The Student Disciplinary Regulations will be followed in the event of academic misconduct.

A special note on plagiarism. Plagiarism is the act of representing, directly or indirectly, another person's work as one's own. It can involve presenting someone's speech, wholly or partially, as your own; quoting without acknowledging the true source of the material; copying and handing in another person's work (including code) with your name on it; and similar infractions. Even indirect quotations, paraphrasing, etc., can be plagiarism unless sources are properly cited.

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I reserve the right to modify the syllabus to reflect the pace of the course.

Course Outline

The Simple Regression Model (Week 1: January 7)

- Chapter 2
- Lewis-Beck, Michael S. and Rice, Thomas W., 1982. Presidential Popularity and Presidential Vote. *Public Opinion Quarterly* 46(4): 534–537.

Multiple Regression Analysis: Estimation (Week 2: January 14)

- Chapter 3

Multiple Regression Analysis: Inference (Week 3: January 21)

- Chapter 4

Multiple Regression Analysis: Further Issues (Week 4: January 28)

- Chapter 6 (we skipped Chapter 5)
- King, Gary. 1986. How Not to Lie with Statistics: Avoiding Common Mistakes in Quantitative Political Science. *American Journal of Political Science* 30(3): 666–687.
- Brambor, Thomas, Clark, William R. and Golder, Matt. 2006. Understanding Interaction Models: Improving Empirical Analyses. *Political Analysis* 14(1): 63–82.

Multiple Regression Analysis with Qualitative Information (Week 5: February 4)

- Chapter 7
- Block Jr, Ray, Matt Golder, Sona N. Golder. 2023. Evaluating Claims of Intersectionality. *Journal of Politics* 85(3): 795–811.

Heteroskedasticity (Week 6: February 11)

- Chapter 8

Model Specification and Data Issues (Week 7: February 25)

- Chapter 9 (skip 9.1)

Pooling Cross Sections across Time (Week 8: March 4)

- Chapter 13 (we skipped Chapters 10-12–read 11 for more on time series)
- Green, Donald P., Kim, Soo Yeon and Yoon, David H., 2001. Dirty Pool. *International Organization* 55(2): 441–468.

Advanced Panel Data Methods (Week 9: March 11)

- Chapter 14
- Beck, Nathaniel and Katz, Jonathan N. 2001. Throwing out the Baby with the Bath Water: A Comment on Green, Kim, and Yoon. *International Organization* 55(2): 487–495.
- De Bouf, Suzanna and Luke Keele. 2008. Taking Time Seriously. *American Journal of Political Science* 52(1): 184–200.

Instrumental Variables Estimation (Week 10: March 18)

- Chapter 15

Limited Dependent Variable Models (Weeks 11–12: March 25, April 1)

- Chapter 17.
- Alt, James E., Gary King, and Curtis S. Signorino. 2001. Aggregation among Binary, Count, and Duration models: Estimating the Same Quantities from Different Levels of Data. *Political Analysis* 9(1): 21–44.