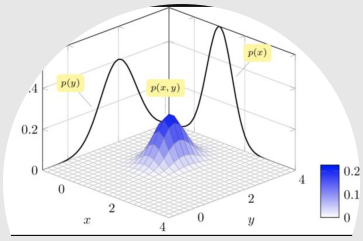

Sci, Tech, & Int'l Affairs II

INTA 8001

Instructor Info

David Muchlinski

Office Hrs: TTH 11:00-12:00

Habersham 147

http://davidmuchlinski.com

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Course Info

Prereq: INTA 6003

Fri

11a-1.45p

Hab 136

Lab Info

TA Info

Overview

This course introduces students to the most common quantitative empirical research design in political science: the linear model. We will put linear regression in context by discussing its mathematical derivation, its assumptions, and its application to observational, experimental, and causal research designs. We will begin with a brief review of probability theory and matrix algebra before introducing the basic two-variable regression model. We will then follow with the multivariate model for hypothesis testing, prediction, and estimation of causal effects. This is followed by the most common pitfalls encountered using the linear model and the appropriate means to resolve violations of the model assumptions.

A prerequisite for this course is INTA 6003 Empirical Research Methods. Students will gain familiarity with the R statistical analysis software and the use of AI generative models to assist in coding. Students will become familiar with this software during the first month of the semester in 3 flipped R Labs. This seminar is mandatory for all Ph.D. students and strongly advised for all Masters students.

Students will be ranked on their participation in the R Labs both inside and outside of the seminar, 3 homework assignments, a midterm, and a final exam that test the skills learned in this seminar. As this material can be technical, the primary mode of instruction will be lecture. However, students are expected to come to each seminar having read all assigned reading. These book chapters and articles will provide you with applications of the linear model in context and are thus invaluable for learning how such research is conducted and presented in the field.

Material

Required Texts

Gujarati, D. N. (2003). Basic Econometrics. Fourth Edition. Boston: McGraw-Hill.

Other

Any required journal articles and book chapters will be provided on Canvas.

Grading Scheme

25%	Flipped R Labs (Total)
25%	Homework Assignments (Total)
25%	Midterm Exam
25%	Final Exam

Grades will follow the standard scale: A = 89.5-100; B = 79.5-89.4; C = 69.5-79.4; D = 60-69.4; F <60. Curing is at the discretion of the professor and will be utilized only to maintain a normal grade distribution. "Rounding" will be implemented provided a student has no outstanding work.

Learning Objectives

- For MS INTA
  - Students will be able to apply basic statistical skills to include quantitative and qualitative methodologies in academic and professional contexts within the field of international affairs.
  - Students will develop research skills in order to produce a research or policy paper on specific technological and scientific issues in international affairs.
- For INTA Ph.D.
  - Students will be able to apply advanced statistical skills and quantitative and qualitative research methodologies in the study of international security.
  - Students will be able to apply advanced research skills in producing publishable research that contributes to the body of scholarly work in technology and international affairs.

Homework

Homework assignments are due two weeks from date assigned. All homework is to be completed and submitted in `R Markdown` .html format via Canvas before the seminar begins. No late work will be accepted except unless covered by the policy below. More detailed instructions will be released for each assignment. Work not submitted in .html format (including .pdf, .docx, or .rmd) will not be accepted and students submitting homework in such formats will be penalized one letter grade for improper format submission per day until resubmission.

Exams

There will be two exams, one midterm and one final. Students will have two weeks to complete each exam. More detailed instructions will be released when assigned.

Make-up Policy and Late Work

Make-up assignments and exams will not be permitted unless in case of legitimate medical or other concerns which should be discussed privately with the professor to determine legitimacy. If an extension is granted, work must be submitted by that time. If a student submits late work without notifying the professor of any change in circumstances, such work will not be accepted and receive a score of zero.

Diversity and Inclusivity Statement

The Institute does not discriminate against individuals on the basis of race, color, religion, sex, national origin, age, disability, sexual orientation, gender identity, or veteran status in the administration of admissions policies, educational policies, employment policies, or any other Institute governed programs and activities. The Institute's equal opportunity and non-discrimination policy applies to every member of the Institute community. The Institute's affirmative action program, Title IX program, and related policies are developed in compliance with applicable law. Pursuant to Title IX, the Institute does not discriminate on the basis of sex in its education programs and activities. As such, the Institute does not tolerate any kind of gender-based discrimination or harassment, which includes sexual violence, sexual harassment, and gender-based harassment. Inquiries concerning the Institute's application of or compliance with Title IX may be directed to the Title IX Coordinator, Burns Newsome, burnsnewsome@gatech.edu, 404-385-5151. Additionally, inquiries concerning the application of applicable federal laws, statutes, and regulations (such as Title VI, Title IX, and Section 504) may be directed to the U.S. Department of Education's Office of Civil Rights at `www2.ed.gov/ocr`.

Accommodations for Students with Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Office of Disability Services at Suite 123, Smithgall Student Services Building, 353 Ferst Drive, 404-894-2563 (Voice); 404-894-1664 (TDD). For more information on Georgia Tech's policy on working with students with disabilities, please see review the Office of Disability Service's web page at `https://policies.ncsu.edu/regulation/reg-02-20-01/`. The Office of Disability Services collaborates with students, faculty, and staff to create a campus environment that is usable, equitable, sustainable and inclusive of all members of the Georgia Tech community. Disability as an aspect of diversity that is integral to society and Georgia Tech. If students encounter academic, physical, technological, or other barriers on campus, the Disability Services team is available to collaboratively find creative solutions and implement reasonable accommodations.

Academic Integrity

Academic dishonesty in the form of cheating or plagiarism will not be tolerated. In brief, plagiarism is defined, for the purposes of this class, as: copying, borrowing, or appropriating another entity's work and presenting it as your own in a any submitted assignment, deliberately or by accident. Acts of plagiarism will be reported in accordance with the Honor Code. In order to avoid being charged with plagiarism, if you use the words, ideas, phrasing, charts, graphs, or data of another person or from published material, then you must either: 1) use quotation marks around the words and cite the source, or 2) paraphrase or summarize acceptably using your own words and cite the source. The plagiarism policy is not restricted to books, but also applies to video and audio content, websites, blogs, wiki's, AI-generated content including, but not limited to, generative AI technologies such as Chat-GPT, and podcasts. All submitted assignments will be run through plagiarism and AI content detection using TurnitIn, the only tool available to Georgia Tech faculty. If this software indicates any potential and substantial usage of AI, that student will be notified and their work will be reported to the Office of Student Integrity automatically. OSI's decisions regarding student culpability will be binding upon me when submitting grades. Plagiarism includes putting your name on a group project to which you have minimally contributed. For information on Georgia Tech's Academic Honor Code, please visit `http://www.catalog.gatech.edu/policies/honor-code/` or `http://www.catalog.gatech.edu/rules/18/`.

Class Schedule

MODULE 1: Getting Familiar with R

Jan 10	Filpped R Lab I	No Required Reading
Jan 17	Flipped R Lab II	No Required Reading
Jan 24	Flipped R Lab III	No Required Reading Homework 1 Assigned
Jan 31	Into to Probability Theory	de Mesquita, E. B., & Fowler, A. (2021). Thinking Clearly with Data: A Guide to Quantitative Reasoning and Analysis. Princeton University Press. Chs. 1-2 Canvas King, G. (1990). On Political Methodology. *Political Analysis*, 2, 1-29. Gill, J. (2006). Essential Mathematics for Political and Social Research. New York: Cambridge University Press. Chs. 7 Canvas
Feb 7	Matrix Algebra	Gill, J. (2006). Essential Mathematics for Political and Social Research. New York: Cambridge University Press. Chs. 3-4, Ch.1 review if needed Canvas
Feb 14	Random Variables & Probability Theory I	Gill, J. (2006). Essential Mathematics for Political and Social Research. New York: Cambridge University Press. Chs. 7-8 Homework 2 Assigned
Feb 21	Statistical Inference	Gelman, A., Hill, J., & Vehtari, A. (2020). Regression and Other Stories. Cambridge University Press. Ch. 4 Canvas de Mesquita, E. B., & Fowler, A. (2021). Thinking clearly with data: A guide to quantitative reasoning and analysis. Princeton University Press. Ch 3, Ch. 11 Canvas
Feb 28	Hypothesis Tests for Regression	Clarke, K. A., & Primo, D. M. (2012). A Model Discipline: Political Science and the Logic of Representations. Oxford University Press. Chs. 1-3 Canvas
Mar 7	Single-Variable OLS Regression	Gujarati, Chs. 1-3 Midterm Exam Assigned
Mar 14	Two-Variable OLS Regression	Gujarati, Chs. 4-6
Mar 21	Spring Break	
Mar 28	Multiple Regression in Matrix Notation	Gujarati, Chs. 7-9

MODULE 2: Relaxing Model Assumptions

Apr 4	Gauss-Markov Violations I	Gujarati, Chs. 7-8, 11-12 Achen, C. H. (2005). Let's Put Garbage-Can Regressions and Garbage-Can Probits where they Belong. *Conflict Management and Peace Science*, 22(4), 327-339.

		Beck, N., Katz, J. N., & Tucker, R. (1998). Taking Time Seriously: Time-series-Cross-section Analysis with a Binary Dependent Variable. *American Journal of Political Science*, 42(4), 1260-1288. Clarke, K. A. (2005). The Phantom Menace: Omitted Variable Bias in Econometric Research. *Conflict Management and Peace Science*, 22(4), 341-352. Enders, A. M., & Uscinski, J. E. (2021). On Modeling the Social-Psychological Foundations of Support for Donald Trump. *American Politics Research*, Online First. ADDITIONAL (OPTIONAL) READING Signorino, C. S., & Yilmaz, K. (2003). Strategic Misspecification in Regression Models. *American Journal of Political Science*, 47(3), 551-566. Achen, C. H. (2002). Toward a new political methodology: Microfoundations and ART. Annual review of political science, 5(1), 423-450. Lee Ray, J. (2003). Explaining Interstate Conflict and War: What Should be Controlled for?. *Conflict Management and Peace Science*, 20(2), 1-31. Tu, Y. K., Gunnell, D., & Gilthorpe, M. S. (2008). Simpson's Paradox, Lord's Paradox, and Suppression Effects are the Same Phenomenon–The Reversal Paradox. *Emerging Themes in Epidemiology*, 5(1), 1-9. Carter, D. B., & Signorino, C. S. (2010). Back to the Future: Modeling Time Dependence in Binary Data. *Political Analysis*, 18(3), 271-292.
Apr 11	Gauss-Markov Violations II	Gujarati, Chs. 7-8, 11-12 Achen, C. H. (2005). Let's Put Garbage-Can Regressions and Garbage-Can Probits where they Belong. *Conflict Management and Peace Science*, 22(4), 327-339. Beck, N., Katz, J. N., & Tucker, R. (1998). Taking Time Seriously: Time-series-Cross-section Analysis with a Binary Dependent Variable. *American Journal of Political Science*, 42(4), 1260-1288. Clarke, K. A. (2005). The Phantom Menace: Omitted Variable Bias in Econometric Research. *Conflict Management and Peace Science*, 22(4), 341-352. Enders, A. M., & Uscinski, J. E. (2021). On Modeling the Social-Psychological Foundations of Support for Donald Trump. *American Politics Research*, Online First. ADDITIONAL (OPTIONAL) READING Signorino, C. S., & Yilmaz, K. (2003). Strategic Misspecification in Regression Models. *American Journal of Political Science*, 47(3), 551-566.

		Achen, C. H. (2002). Toward a new political methodology: Microfoundations and ART. Annual review of political science, 5(1), 423-450. Lee Ray, J. (2003). Explaining Interstate Conflict and War: What Should be Controlled for?. *Conflict Management and Peace Science*, 20(2), 1-31. Tu, Y. K., Gunnell, D., & Gilthorpe, M. S. (2008). Simpson's Paradox, Lord's Paradox, and Suppression Effects are the Same Phenomenon–The Reversal Paradox. *Emerging Themes in Epidemiology*, 5(1), 1-9. Carter, D. B., & Signorino, C. S. (2010). Back to the Future: Modeling Time Dependence in Binary Data. *Political Analysis*, 18(3), 271-292. Midterm Assigned
Apr 18	Panel Data Models	Gujarati Ch. 16 Clark, T. S., & Linzer, D. A. (2015). Should I use Fixed or Random Effects?. *Political Science Research and Methods*, 3(2), 399-408. Bell, A., & Jones, K. (2015). Explaining Fixed Effects: Random Effects Modeling of Time-Series Cross-Sectional and Panel Data. *Political Science Research and Methods*, 3(1), 133-153. King, G., & Roberts, M. E. (2015). How Robust Standard Errors Expose Methodological Problems they do not Fix, and What to do About it. *Political Analysis*, 23(2), 159-179. Aronow, P. M. (2016). A Note on "How Robust Standard Errors Expose Methodological Problems They Do Not Fix, and What to Do About It". arXiv preprint arXiv:1609.01774. Professor Away for Conference. No Class
Week 16	Research Presentation	22:00 Slides to Canvas Final Paper Due Time TBD