POS 603: Polimetrics I
Fall 2025
2-4:45 PM Mondays in Coor Hall 6631

Contact Information

Instructor: Timothy M. Peterson
Email: tmpete15@asu.edu
Zoom meeting room: link
Office hours: M 1-2 (Coor 6754) or email for an appointment

TA: Yilin Che
Email: yche13@asu.edu
Zoom meeting room: link
Office hours: Tu 1-2 (Zoom); Th 1-2 (Coor 6767)

About the Course

This course is designed to train students in hypothesis testing with a linear model. We will focus on identification, estimation, and diagnostics of linear models. Students will leave this course able to understand and interpret linear regression models as well as to apply this method to novel research.

The linear model, estimated with Ordinary Least Squares (OLS), is an intermediate step in the development of methodological skills. Though it is designed for continuous outcome variables, the basic form of the linear model is extended to a broad array of models for limited outcome variables. Therefore, mastery of the linear regression model is an essential building block for important methods encountered throughout a graduate curriculum; and such understanding is crucial if one is to be a sophisticated consumer and producer of political science research.

Learning outcomes

By the end of this course, students will:

- Use R to manage and visualize data, estimate linear models, and conduct regression diagnostics
- Communicate verbally and visually the substantive results of linear models
- Diagnose whether multicollinearity, heteroskedasticity, autocorrelation, or functional-form issues pose threats to statistical inference and correct for these problems
- Interpret regression models with multiple inputs, dummy variable inputs, transformed inputs, and interactions
- Apply OLS to data with unobserved heterogeneity

Classroom policies

All cell phones should be turned off or muted during classroom meetings. The use of laptop computers is permitted and in fact is required for most class meetings. Students should treat the professor and each other with respect. Students should arrive a few minutes early since class will begin promptly on time. Each class will include a 15-minute break.

Technology requirements

This course requires a computer with Internet access and a web browser (such as Chrome or Mozilla Firefox). ASU offers a number of on-campus computer labs for those without their own computers. Laptops are available to be checked out. See: https://lib.asu.edu/makerspace/services/tech-lending.

ASU email is the official means of communication among students, faculty, and staff. Please try to email me from your ASU account. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU email regularly. All instructor correspondence will be sent to your ASU email account.

This course uses Canvas for assignments and some communication. It can be accessed through MyASU at https://my.asu.edu, or through the Canvas home page at https://myasucourses.asu.edu. To monitor the status of campus networks and services, visit the System Health Portal at https://syshealth.asu.edu/. For those requiring technical assistance, there is a 24/7 live chat service at contact.asu.edu or My ASU Service Center. Students can also call toll-free at 1-855-278-5080. Before calling technical support, try the following:

1. Use a different browser. Some browsers may not work and switching your browser may solve the issue.
2. Sign out of the course and log back in.
3. Clear your browser cache. To find out how, search "clear cache" followed by the name of your browser for a list of web sites with step-by-step instructions.
4. Disable your browser's pop-up blocker. To find out how, search "disable pop-up blocker" followed by the name of your browser. You will get a list of sites with instructions specific to your browser.

Accessibility statement

Qualified students with disabilities may be eligible to receive academic support services and accommodations. Eligibility is based on qualifying disability documentation and assessment of individual need. Students who believe they have a current and essential need for disability accommodations are responsible for requesting accommodations and providing qualifying documentation to Student Accessibility and Inclusive Learning Services (SAILS).

Every effort is made to provide reasonable accommodations for qualified students with disabilities. Prior to receiving any disability accommodations, verification of eligibility from SAILS is required. Once registered with SAILS, students with disabilities must meet with the instructor to discuss what reasonable accommodations they will need to be successful in this course. Students with disabilities that are known at the time this course begins are encouraged to make your request for accommodations at the beginning of the semester, either during office hours or by appointment. For disabilities that arise after the course has begun, students should meet with the instructor at the earliest possible time to arrange accommodations for their learning needs. Disability information is confidential.

Qualified students who wish to request an accommodation for a disability should contact SAILS by going to https://eoss.asu.edu/accessibility, calling (480) 965-1234 or emailing student.accessibility@asu.edu.

Accommodations for religious practices

The university community should, in all its activities, be sensitive to the religious practices of the various religious faiths represented in its student body and employees. Faculty are asked to recognize the obligations of their students who may be participating in the observance of religious holidays. Students should notify faculty at the beginning of the semester about the need to be absent from class due to religious observances. For more information, visit: https://www.asu.edu/aad/manuals/acd/acd304-04.html.

Missed classes due to University-sanctioned Events

Students who participate in university-sanctioned activities that require classes to be missed, shall be given opportunities to make up examinations and other graded in-class work. Normally, the made-up work will be due on the class day immediately after the absence. Absence from class or examinations due to university-sanctioned activities does not relieve students from responsibility for any part of the course work required during the period of the absence. For more information, visit: https://www.asu.edu/aad/manuals/acd/acd304-02.html.

Academic integrity

Students are expected to abide by the Student Academic Integrity Policy. Academic honesty is expected of all students in all examinations, papers, laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see: https://provost.asu.edu/academicintegrity. Students who violate the Academic Integrity Policy will automatically receive a failing grade.

Some assignments in this course may include or allow use of Artificial Intelligence (AI), including ChatGPT or related tools for the creation of text, images, computer code, audio, or other media. The instructor will inform you when, where and how you may use these tools, and provide guidance for attribution. Use of generative AI tools in any other context in this course will be considered a violation of the ASU Academic Integrity Policy, and students may be sanctioned for confirmed, non-allowable use. If at any point you have questions about what is permitted, contact the instructor to discuss before submitting work.

Policy against threatening behavior

Both inside and outside of the classroom, students are required to conduct themselves in a manner that promotes an environment that is conducive to learning and other university-related business. All incidents and allegations of violent or threatening conduct by an ASU student will be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students. Such incidents will be dealt with in accordance with the policies and procedures described in Section 104-02 of the Student Services Manual, available at: https://www.asu.edu/aad/manuals/ssm/ssm104-02.html.

Prohibition against discrimination, harassment, and retaliation

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at: https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services is available if you wish discuss any concerns confidentially and privately: https://eoss.asu.edu/counseling.

Copyrighted materials

Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the your original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement. The Computer, Internet, and Electronic Communications Policy is here: http://www.asu.edu/aad/manuals/acd/acd125.html.

Course Requirements

Attendance and participation

Though graduate methods courses include lectures, this course nonetheless depends heavily on student-led discussion and analysis. Students should attend class meetings prepared to take part in the discussion of the assigned readings each week. Students should read the assigned readings for the week before class each week. The course TA will keep track of attendance.

Required texts

You do not have to purchase any textbooks for this class. We will use selections of free, typically open source materials that either I will upload to Canvas, or which can be accessed online with links provided in this syllabus.

Nguyen, M. 2020. A Guide on Data Analysis. Bookdown: link

van Holm, J. 2020. Introduction to Research Methods. Bookdown: link

Wickham, H., M. Çetinkaya-Rundel, and G. Grolemund. 2023. R for Data Science (2e). link

Assignments

A total of six homework assignments will be distributed throughout the semester, posted one week before they are due. Further, a course paper will be due in stages throughout the semester, with the complete paper due during finals week. Grading policies for each assignment will be included with each assignment description in Canvas.

Course Grades

Course grades will consist of: attendance and participation (30%), homework assignments (30%), and the course paper (40%). Letter grades will be assigned in accordance with the standard ASU grading scheme.

Schedule

NOTE: Any changes to the schedule listed below will be emailed to you and posted to the course Canvas page.

Week 1 (August 25): Introductions

Lecture	personal introductions, the purpose of the class, getting on the same page for in-class lectures and tutorials
Tutorial	R and LaTeX refresher

Week 2: (September 1): Class canceled for labor day

Week 3: (September 8): Data

Lecture	levels of measurements; summarizing, visualizing, and communicating data; associations between variables; probability distributions; hypothesis testing
Tutorial	workflow; data management; missing data; visualization
Read before class	Lilja and Linse ch2; van Holm ch11; Wickham et al. "Whole Game" and "Visualize" sections

Week 4 (September 15): Simple linear regression pt 1

**Note: homework 1 due on Canvas by the start of class*

Lecture	intro to OLS; calculating and interpreting coefficients
Tutorial	the lm() function
Read before class	OpenIntro ch8, but skip 8.3 for now; van Holm ch14;

Week 5 (September 22): Simple linear regression pt 2

Lecture	linearity; normal, mean-zero, and constant-variance residuals; outliers and leverage
Tutorial	the lmtest package
Read before class	OpenIntro section 8.3; van Holm ch16 (skip 16.1.7)

Week 6 (September 29): Multiple linear regression pt 1

**Note: homework 2 due on Canvas by the start of class*

Lecture	Calculating and interpreting coefficients; visualizing marginal effects and predicted values
Tutorial	creating prediction data; the predict() function
Read before class	OpenIntro ch9 through 9.4; van Holm ch15

Week 7 (October 6): Multiple linear regression pt 2

**Note: hypotheses, data set, and codebook due online*

Lecture	Week 5 topics revisited; independence; multicollinearity and micronumerousity; why to include—or exclude—potential control variables
Tutorial	more diagnostics; model fit stats
Read before class	Ngyuen ch15

Week 8 (October 13): Class canceled for Fall Break

Week 9 (October 20): Modeling non-linearity in linear regression

**Note: homework 3 due on Canvas by the start of class*

Lecture	logged-linear, linear-log, and log-log models; polynomial terms
Tutorial	syntax for logs and polynomials, interpretation "by hand"
Read before class	van Holm ch17, but skip 17.1.4; Ngyuen ch12; Wickham et al. "Transform" section

Week 10 (October 27): Conditionality and interactions in linear regression

Lecture	multiplicative interactions: specification, interpretation, and visualization
Tutorial	syntax for multiplicative interactions; interpretation via the margins() function
Read before class	van Holm section 17.1.4; Ngyuen ch18 through 18.7

Week 11 (November 3): Linear regression with a time series

**Note: homework 4 due on Canvas by the start of class*

Lecture	serial correlation; trends; stationary processes
Tutorial	lagged dependent variables, differenced variables
Read before class	Brockwell and Davis ch1 through 1.4; Ngyuen ch11; Wickham et al. "Import" section

Week 12 (November 10): Linear regression with un-modeled group heterogeneity

**Note: research design and preliminary results due on Canvas by the start of class*

Lecture	grouped data; repeated cross-sections; panel data
Tutorial	fixed effects via OLS; the plm() function
Read before class	Karreth tutorial 14: Working with grouped data: link; Shah, "A Comprehensive Guide to Panel Data Regression in R:" link

Week 13 (November 17): Linear regression and causal inference

**Note: homework 5 due on Canvas by the start of class*

Lecture	difference-in-difference; regression discontinuity
Tutorial	DID and RDD using OLS
Read before class	Ngyuen ch21, ch30, ch27

Week 14 (November 24): Linear probability models and the limits of linearity

Lecture	limited DVs ; introduction to the logit link function
Tutorial	the glm() function; revisiting the predict() function
Read before class	OpenIntro section 9.5

Week 15 (December 1): Paper presentations

**Note: homework 6 due on Canvas by the start of class*

Final paper due at 2 PM on Monday, December 8