POLS 602	Fall 2021
	TR 1:30-2:45pm
Quantitative Political Analysis	LASB 317

Professor:
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Purpose, objectives, and prerequisites

A thorough understanding of the linear regression model is essential for any social scientist. The tractability and ubiquity of this model makes it a natural starting point for aspiring researchers, and familiarity with the linear model is required for any consumer or producer of quantitative work. Additionally, familiarity with the linear regression framework will help you understand more advanced regression models that you'll encounter throughout your training and career. We will focus on both understanding the theory behind the linear model and on its application to political science research.

By the end of the semester you should be able to:

1. understand and explain the statistical theory and concepts that underpin the linear model and its extensions;
2. use the R programming language to conduct applied data analysis using the linear model.

There are no prerequisites for this course.

Text book

The following text book will be our main reference. I *strongly* encourage you to purchase rather than rent as this can be an important reference book for you for years (I still consult my copy regularly while conducting research).

- Greene, William H. *Econometric Analysis.* (Any edition)

Some other good books that may help you if you find Greene to be too dense on any particular topic

- Dougherty, Christopher. *Introduction to Econometrics*
- Johnston, Jack and John DiNardo. *Econometric Method*
- Woolridge, Jeffrey. *Introductory Econometrics.*
- Angrist, Joshua D. and Jorn-Steffen Pischke *Mostly Harmless Econometrics*

It may behoove you to find a simple book (or online resource) for R programming. My `website` provides notes that I have used for graduate students in the past, you may or may not find them helpful.

Software

We will make frequent use of the R programming language this semester. Reasons we like R:

1. it's the lingua franca of applied statistics — it enjoys wide use in private, public, and academic settings;
2. it's free to download for any computer (Mac, Windows, or Linux) from `https://cloud.r-project.org/`;
3. it's more versatile than other statistics-specific software.

Course website

In an effort to teach you something else worth while we use github for the course page. All materials will be available for download here: .

Additionally, all problem sets and exams will be submitted using GitHub Classrooms. By the next class, please register a github account (I recommend getting an official, but free, academic account) and send your username to me. We will go over how to submit assignments in class. A PDF on the course website covers this in more detail as well.

Course Requirements

Evaluation is based on

- Homeworks (1/3 of your final grade): Five or six equally weighted problem sets will be distributed throughout the semester. Answers to problem set questions will be typeset and written in complete sentences. Handwritten problem sets will not be accepted. Answers that do not show and describe work (step-by-step math and/or R code and 1 or more sentences describing your process) will be marked as zero. All code files should be included with your problem set submission and should run completely without trouble. This semester is your best chance to be bad at using LaTeX and practice with it so that you eventually get good at it. My website contains a primer to help you get started with LaTeX, but some of it may be out of date.

- Exams (1/3 of your final grade each): Two 24 take-home exams (a midterm and a final) will be given. The midterm is tentatively scheduled for October 26th, while the final is tentatively scheduled for the last day of class. We can negotiate both of these dates based on health conditions and your other course load.

Final grades will follow the standard 10 point increments [90,100] is an A, [80, 90) is a B, [70, 80) is a C, and so on.

Disability statement

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit `http://disability.tamu.edu`. Disabilities may include, but are not limited, to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Attendance and makeup work

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments. Please refer to Student Rule 7 in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a students grade, for the reasons stated in Student Rule 7, or other reason deemed appropriate by the instructor. Please refer to Student Rule 7 in its entirety for information about makeup work, including definitions, and related documentation and timelines. "Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1). "The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2). Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. (See Student Rule 24.)

Academic Integrity

"An Aggie does not lie, cheat or steal, or tolerate those who do."

"Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to authenticate ones work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

You can learn more about the Aggie Honor System Office Rules and Procedures, academic integrity, and your rights and responsibilities on the website `https://aggiehonor.tamu.edu/`.

Additionally, the department has specific standards on academic dishonest and misconduct. These files are available on Canvas.

Title IX and Statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate

assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

- The incident is reasonably believed to be discrimination or harassment.
- The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, you will be able to control how the report is handled, including whether or not to pursue a formal investigation. The Universitys goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS). Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the Universitys Title IX webpage. Students and faculty can report non-emergency behavior that causes them to be concerned at `http://tellsomebody.tamu.edu`.

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a students academic success and overall wellbeing. Students are encouraged to engage in proper self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at `suicidepreventionlifeline.org`.

COVID-19

The Faculty Senate temporarily added the following statements to the minimum syllabus requirements in Fall 2020 as part of the universitys COVID-19 response: "To help protect Aggieland and stop the spread of COVID-19, Texas A&M University urges students to be vaccinated and to wear masks in classrooms and all other academic facilities on campus, including labs. Doing so exemplifies the Aggie Core Values of respect, leadership, integrity, and selfless service by putting community concerns above individual preferences. COVID-19 vaccines and masking regardless of vaccination status have been shown to be safe and effective at reducing spread to others, infection, hospitalization, and death."

Diversity Statement

The Department of Political Science supports the Texas A&M University's commitment to diversity, and welcomes individuals of any race, ethnicity, religious identity, age, gender, sexual orientation, class, disability, and nationality. (See `http://diversity.tamu.edu/`). In the spirit of this vital commitment, in this course each voice in the classroom has something of value to contribute to all discussions. Everyone is expected to respect the different experiences, beliefs and values expressed by fellow students and the instructor, and will engage in reasoned discussion that refrains from derogatory comments about other people, cultures, groups, or viewpoints.

Course Topics

We will cover as many of the following topics as we can (we will almost certainly not cover all of them). We may also delete some sub-topics along the way if time gets scarce.

0. Pre-introduction: Math Camp
    - Aug. 30 – Sept. 2 Calculus with Ahmer
    - Sept. 6 – Sept. 9 Math Stats with me:
        - Probability
        - Random variables and univariate distributions
        - Joint and conditional distributions
        - Estimation, hypothesis testing, and parametric models

– Limit theorems and important results

1. Correlation and the simple regression model
2. Linear Algebra
3. Multiple regression using the Ordinary Least Squares (OLS) estimator
   - Finite sample properties of the OLS estimator
   - Large sample properties
   - Justifications of OLS
   - Hypothesis testing
   - Prediction
4. Specification problems and extensions of OLS
   - Assessing goodness-of-fit
   - Omitted variable bias and inclusion of irrelevant variables
   - Heteroskedasticity and violations of normality
   - Outliers and multicolinearity (EXAM 1 around here)
   - Functional forms (logs, polynomials, dummies variables, interactions)
   - Measurement error
5. Endogeneity and instrumental variables
   - Causes and consequences of endogeneity
   - Two-stage least squares
   - Weak and many instruments
6. Crash course on time series and panel data (Cover what we can here; you'll return to this if you take space time)
   - Stationary data
   - Newey-West standard errors
   - ARDL models
   - Unit root tests
   - Fixed effects, Random effects, and Hausman tests
   - Clustered standard errors (Goal is to get at least this far)
   - Dynamic panel models
   - Instrumental variables

Final Disclaimer

The schedule, policies, procedures, and assignments in this course are subject to change in the event of extenuating circumstances, by mutual agreement, and/or to ensure better student learning.