POLS 309	Spring 2020
Section 902	MWF 9:45-10:35am
Section 901	MWF 10:55-11:45am
Section 905	MWF 1:15-2:05pm
Polimetrics	Allen 1016

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LASB 335
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Purpose and objectives

Data analysis is an increasingly in-demand skill. It requires analytic thinking and a level of precision that will make you both more marketable in the workplace but also a better consumer of information. This course builds on POLS 209 (a prerequisite) to provide you with more sophisticated tool for handling and understanding data. Our main focus will be on data analysis, but we will also consider statistical programming and good writing. Throughout, we will focus on **clearly** and **concisely** building arguments supported by data.

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

1. define and understand important statistical concepts and method;

2. use the R programming language to complete homework and a research project;

3. interpret and evaluate statistical output;

4. complete a well-written research paper that uses data to build an argument.

This is a challenging course on **math**, **programming**, and **writing**. Many of you will find one or more of those things difficult. You should be prepared to devote significant time outside of class to mastering this material. I caution anyone who is here just to fill a writing requirement — this will not be easy.

Text book

To buy or rent from the bookstore/Amazon:

- Bailey, Michael A. 2019. "Real Econometrics: The Right Tools to Answer Important Questions." 2nd Edition. Oxford University Press.

Available free online:

- Diez, David, Mine Cetinkaya-Rundel, and Christopher Barr. 2019. "OpenIntro Statistics." 4th Edition. Available from: `https://www.openintro.org/stat/textbook.php?stat_book=os`.

It may behoove you to find a simple book (or online resource) for R programming. My `website` provides notes that I use for graduate students, you may or may not find them helpful. Additional readings on how to write a research paper will be posted to eCampus.

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 powerful and versatile than other statistics-specific software.

Friday labs sessions held in LASB 170 and will focus on developing and applying R skills. This is an important part of the course and it will be very difficult to do well in the course if you do not attend lab.

Course Requirements

Evaluation is based on

- Homeworks (30%): Five equally weighted problem sets will be distributed throughout the semester. Answers to problem set questions will be typed and written in complete sentences. Handwritten problem sets will not be accepted. Answers that do not show and describe work

(step-by-step math or R code and 1 or more sentences describing your process) will be marked as zero. The lowest scoring problem set will be dropped for each student. Students will be taught how to write their problem sets using the R markdown language during the lab sessions. **All problem sets must be submitted in pdf format using R markdown.**

- Exams (20% each): Two in-class midterm exams will be given. Exam content will be based on lectures, problem sets, and the textbook. Calculators are allowed and encouraged for these exams.

- Research project (30%). A final research paper that requires you to produce your own data analysis. The final paper must be least 10 double-spaced pages with a standard 12pt font (e.g., Calibri or Times New Roman), and 1 inch margins. Thoroughly cite your paper using the APSA style guide for references and citations (`https://mk0apsaconnectbvy6p6.kinstacdn.com/wp-content/uploads/sites/43/2018/11/Style-Manual-for-Political-Science-2018.pdf`).

  This project is broken into the following segments.

  1. Proposal (5% of final grade; due 2/5): In 3-5 pages explain and plan your intended research project. This proposal should include a research question, a brief summary of relevant theoretical work (at least 4 scholarly articles from within the last 5 years), and at least one testable hypothesis that follows these papers and addresses your research question. Even if you pass this assignment, you may be asked to find a few research topic if I don't think your plan is doable.

  2. Data description (5% of the final grade, due 3/2): In 2-3 pages recap your research question and basic argument and describe your data. You must *have* at least the dependent variable and the main independent variable in your possession by this point describe where they came from, how they are measured, and why they are appropriate for your research question. Additionally, you must provide and discuss some summary statistics (e.g., means, standard deviations, histograms) and very preliminary analysis (e.g., correlation, difference-in-means tests). You will be assessed based on how well the data fits your research question, how appropriate the statistics and analysis you choose to conduct are for your data.

3. Rough drafts and feedback (due 4/8 and 4/24): The rough drafts will not be graded, but feedback will be provided (first by the TA, then by a 2 classmates) to make your final project better. Additionally, two points will be deducted from your final paper for every day the rough draft is late.

4. Classmate feedback (due 4/27): On 4/24 you will receive papers from two of your fellow students. In 1-2 pages per paper you will prepare written feedback for them to improve their project. Focus on both the content (e.g., additional diagnostics, interpretation mistakes, persuasiveness of the argument) and the writing (e.g., sentence fragments, homophones, transitions between paragraph). As with the rough draft this feedback is not graded, but two points will be deducted from your final paper for every day your written feedback is late.

5. Final paper (20% of your final grade, due by midnight May 1st) In 10-15 pages your final project should contain:

   (a) An introduction that provides a research question, a thesis statement, and an overview of your argument.

   (b) A theory section that provides a clear, concise review of theoretical work that relate to your question and build your argument.

   (c) A clearly stated hypothesis that extends the existing analysis.

   (d) A methods section overview of the data and methods used to test your hypothesis.

   (e) A results section that clearly presents your (correctly run) tests, your results, your (correct) interpretation of the results, and diagnostic tests on your model of choice. Use these results to assess your argument (Note: finding that your argument is not supported by the data is perfectly fine).

   (f) A conclusion that recaps all of the above; discusses the shortcomings of your analysis and how they might be addressed in future work; and provides your final thoughts on research question.

   (g) A list of references in APSA format.

All assignments are due by the end of class on the assigned due date unless stated otherwise. Late assignments are penalized by 1 letter grade for every

24 hours it is late. These penalties are waived with either a university-approved absence or pre-negotiation with the TA. Make-up exams will only be administered in the case of a university-approved absence. Note that religious holidays are always excused absences. For more information, see Rule 7 (`https://student-rules.tamu.edu/rule07/`). Please make all travel plans accordingly.

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 Extra Credit

Attendance is highly encouraged but not graded. It will be very difficult to do well if you don't show up to lectures and labs. As an incentive, 4 extra points of extra credit will be given to any students with perfect attendance (including labs) Exceptions are made for university-approved absences.

Slides will be posted online but they are not a substitute for good attendance. By design the slides are difficult to understand or follow without good notes on the lecture. Likewise, I will often deviate from the slides to reinforce points or address questions. As such, while the slides provide a good outline for that day's lecture they will be very incomplete relative to the in-class experience. If you miss class for any reason, I highly encourage you to copy notes from one of your colleagues.

Grading

Exams and problem sets are graded by the Teaching Assistant. If an arithmetical error is discovered, students should approach the TA, who will fix the error. However, if a student wishes to challenge a grade of all or part of the exam or problem set, the following steps must be taken:

1. Email the instructor within 72 hours of the exam or problem set being returned (i.e., if a problem set is returned at the end of class Monday you have until that time on Thursday to appeal).

2. For each disputed element, the student must explain in complete, detailed sentences why the grade should be adjusted.

3. If the instructor deems that there is enough ground for the challenge, he will re-grade the entire exam or problem set. The student's grade may go up, down, or remain unchanged.

Any appeals not following this format will be ignored.

Final grades will be based on the above course requirements. The grading scale is as follows:

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\begin{array}{ll}
80 \leq x & \text{A} \\
60 \leq x < 80 & \text{B} \\
40 \leq x < 60 & \text{C} \\
20 \leq x < 40 & \text{D} \\
x < 20 & \text{F}
\end{array}
$$

Academic Integrity

Please be familiar with the University's academic honesty policies (url: `https://aggiehonor.tamu.edu/`). Violations will be handled with the utmost seriousness. Violators will be referred to the honor system office. As always, "An Aggie does not lie, cheat or steal, or tolerate those who do."

Writing Center

This is a writing-intensive course. As such, you are required to submit written work that correctly uses the tools from this **and** follows good writing practices. These rules apply to both homeworks and the final research project.

If you want help or feedback with your writing (hint: you do) you are encouraged to visit the University Writing Center (UWC) in 214 Evans Library or 205 West Campus Library. UWC offers one-on-one help at any point in writing process (e.g., brainstorming, drafting, documenting, revising, proofreading, and more). I *highly recommended* you visit them at least once this semester. For more information visit `https://writingcenter.tamu.edu/`.

Title IX and Statement on Limits to Confidentiality

Texas A&M University and the College of Liberal Arts are committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws provide guidance for achieving such an environment. Although class materials are generally considered confidential pursuant to student record policies and laws, University employees including instructors cannot maintain confidentiality when it conflicts with their responsibility to report certain issues that jeopardize the health and safety of our community. As the instructor, I must report (per Texas A&M System Regulation 08.01.01) the following information to other University offices if you share it with me, even if you do not want the disclosed information to be shared:

Allegations of sexual assault, sexual discrimination, or sexual harassment when they involve TAMU students, faculty, or staff, or third parties visiting campus.

These reports may trigger contact from a campus official who will want to talk with you about the incident that you have shared. In many cases, it will be your decision whether or not you wish to speak with that individual. If you would like to talk about these events in a more confidential setting, you are encouraged to make an appointment with the Student Counseling Service (`https://scs.tamu.edu/`).

Students and faculty can report non-emergency behavior that causes them to be concerned at `http://tellsomebody.tamu.edu`.

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 Schedule

13 January: Course Introduction and Syllabus Review

Unit 1: Review of Statistical theory and concepts. Intro to R

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15 January: Probability Review

- OpenIntro Ch. 2

- Zuhlke "How to Write Like a Mathematician"

- Crisman-Cox "On Building an R Report"

- Problem set 1 assigned

17 January: LAB DAY
20 January: MLK Day, No Class
22 January: Random variables

- OpenIntro Ch. 2

24 January: LAB DAY
27 January: Normal distribution

- OpenIntro Ch. 3

29 January: Estimation and the CLT

- OpenIntro Ch. 3-4

- Problem set 1 due

- Problem set 2 assigned

31 January: LAB DAY
3-5 February: Estimation and hypothesis testing

- OpenIntro Ch. 4-5

- Research proposal due

7 February: LAB DAY
10 February: More hypothesis testing
12 February: Review

- Problem set 2 due

14 February: LAB DAY
EXAM: February 17th

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Unit 2: The linear model

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19 February: Causal inference and design

- Bailey Ch. 1; Berry & Sanders Ch. 1

21 February: LAB DAY
24-26 February: Correlation and the Linear Model

- Bailey Ch. 3 & Sanders Ch. 2

- Problem set 3 assigned (2/26)

28 February: LAB DAY
2-4 March: Properties of OLS and multiple regression I

- Bailey Ch. 3-5; Berry & Sanders Ch. 2-3

- Data description due (3/2)

6 March: LAB DAY
9-11 March: Spring Break NO CLASS
16-18 March: Multiple regression

- Bailey Ch. 5; Berry & Sanders Ch. 3-4

- Problem set 3 due (3/18)

- Problem set 4 assigned (3/18)

20 March: LAB DAY
23-25 March: Dummy variable regression

- Bailey Ch. 6

27 March: LAB DAY
30 March- 1 April: Specification and transformation

- Bailey Ch. 7

- Problem set 4 due (4/1)

3 April: LAB DAY
EXAM: April 6th

Unit 3: Advanced topics and writing

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8 April: Writing workshop

- Reading Berry and Sanders Ch. 5 & Becker Ch. 1-5

- Problem set 5 assigned

- Rough drafts due

10 April: READING DAY NO CLASS
13-15 April: Interaction terms

- Bailey Ch. 6

17 April: LAB DAY
20-22 April: Nonstandard standard errors

- Problem set 5 due (4/22)

24 April: LAB DAY

- Second rough draft due

27 April: Course wrap up and writing workshop

- Classmate feedback due

Final draft due by Midnight May 1st

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.