

# **POLS 3316 Statistics for Political Scientists**

Tuesday/Thursday 2:30–4:00PM, Room: PGH 200

Department of Political Science

University of Houston

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## **Instructor**

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Office hours (virtual): Friday 2–5pm, or by appointment

## **Course Description**

This is an undergraduate-level course aimed to teach students various statistical skills. This course focuses on the most important concepts in statistics such as hypothesis testing and regression. It does not involve advanced mathematical techniques like calculus and linear algebra. Rather, much of our attention will be focused on using appropriate statistical tools to solve problems that we may encounter in our daily life. The class will meet twice a week, with the Tuesday class devoted to theoretical explanations and the Thursday meeting to the lab. Students are supposed to bring their laptops to the class for Thursday's lab. They may also check out laptops from the [UH Library Equipment Services](#).

## **Statistical Tool**

We will choose R as the statistical tool for this class. R is an open-source statistical software developed by statisticians. It is one of the most popular statistical tools in both the academia and business world. There are platforms that make R easier to use. Those platforms are called Integrated Developing Environment (IDE). IDEs have a battery of features important to developers, including coding style, package management, debugging, etc. This course will choose RStudio, which is probably the most popular

IDE for R. Students are supposed to install R and RStudio as soon as possible. They can download and install the software based on their own computer systems. Click the blue link to download R for [Windows](#) and [MacOS](#) respectively. As for RStudio, the free desktop version will suffice this class. The link for RStudio is available [here](#). Note that if you are running a 32-bit system, then you need to install an older version by clicking [here](#).

There is a very useful package in R called RMarkdown that is convenient for homework assignment. RMarkdown can incorporate R code, outputs, and texts in a single file, thus avoiding repeated copying and pasting of code and outputs. It can also be a good tool for formatting your document. Students are strongly encouraged to use RMarkdown for their homework, but they are free to use Word if they prefer. I will offer a tutorial on how to use RMarkdown in the third lab session on September 9.

To encourage students to install R and RStudio in a timely manner, 2% bonus points will be offered if they successfully get the two softwares installed by the end of the first week. This is a small bonus, but it can have a large impact. The bonus will be based on their final grade. Students getting a final grade of 78 out of 100 will earn additional 1.56 points if they finish this easy task, which could change their letter grade from  $C+$  to  $B-$ . Likewise, a student scoring 88 out of 100 can end up getting an  $A-$  instead of  $B+$  if they earn additional 1.76 points through this task. More details on this bonus point will be announced in the first class meeting.

## Course Materials

This course will adopt the textbook entitled *Even You Can Learn Statistics and Analytics: An Easy to Understand Guide to Statistics and Analytics* by David M. Levine and David F. Stephan. As is suggested by the title, this book is intended to help students conquer fear about statistics and discover the fun in dealing with data. We will primarily focus on one chapter each week. In addition to learning statistical theories, we will also use R to learn how those theories and techniques are applied to solve real-world problems. Students need not buy additional books to study R, because major R skills will be covered and explained in the lab session. If students are interested in learning more R skills, they may consider textbooks listed below as “recommended.”

The lab session will be based on a lab handout, which is a zip file containing a dataset to be used for the lab, a pdf file that includes R code, outputs, and notes. Besides, it also contains an rmd file, which is the source file used to compile the pdf document. Students will be able to run R code within the rmd file and edit the rmd file to generate

their own pdf documents. During the lab session, I will walk students through the lab handout and make sure they understand R code.

- (Required) Levine, D. M., & Stephan, D. (2014). *Even You Can Learn Statistics and Analytics: An Easy to Understand Guide to Statistics and Analytics*. Pearson Education. [E-copy available at UH library]
- (Recommended) Monogan, J. E. (2015). *Political Analysis Using R*. Springer.
- (Recommended) Field, A., Miles, J., & Field, Z. (2012). *Discovering Statistics Using R*. Sage Publications.
- (Recommended) Salkind, N. J., & Shaw, L. A. (2019). *Statistics for People Who (Think They) Hate Statistics Using R*. Sage Publications.

## Grading Policy

1. Attendance: 10%
2. Three problem sets: 60%
3. A final exam: 30%
4. Additional bonus points: 2% (based on the sum of the above three)
5. Grade conversion

A	∈ [94, 102]	Excellent
A-	∈ [90, 93]	
B+	∈ [86, 89]	
B	∈ [83, 85]	
B-	∈ [80, 82]	Good
C+	∈ [76, 79]	
C	∈ [73, 75]	
C-	∈ [70, 72]	Average
D+	∈ [66, 69]	
D	∈ [63, 65]	
D-	∈ [60, 62]	Poor
F	∈ [0, 59]	Failing

Attendance is mandatory. Absence without a University-accepted excuse will be penalized. However, flexible arrangements are allowed for the first two weeks per the University's policy about "soft opening". The first two weeks will be characterized by a hybrid form of teaching. Half of the students—who are randomly selected based on their student ID—will come in person, and the remaining half must attend the class

online through Microsoft Teams. The online and in-person group will be switched in the second week to make sure that everyone can attend an in-person class in each week. No matter which groups a student belongs to, attendance is mandatory.

There will be three take-home problem sets, with each accounting for 20% of the final grade. Students will be given one week to accomplish each problem set on their own. No one is allowed to plagiarize other people's work. If caught, he or she will receive a zero on that assignment. Moreover, students should turn in their homework via Blackboard in a timely manner. Late submissions will lead to a penalty as follows:

- Lateness within 24 hours of the deadline will result in a 5-point penalty.
- Lateness within 48 hours of the deadline will result in a 10-point penalty.
- Homework submitted over 48 hours later than the deadline will NOT be accepted.

## Assignments and Deadlines

- September 21: distributing the first problem set. **Due at noon, September 28.**
- October 19: distributing the second problem set. **Due at noon, October 26.**
- November 16: distributing the third problem set. **Due at noon, November 23.**
- December 7: distributing the final exam. **Due at noon, December 12.**

## COVID-19 Protection

Given the spread of COVID-19 and variants, students should pay sufficient attention to personal protection. While the mask mandate has been lifted, wearing a mask in class is strongly encouraged. Besides, social distancing of at least six-feet (about two arms' length) should be maintained.

The University is providing free tests of COVID-19 near the Student Center South. The test will just take a couple of minutes and the results are available in one or two days. An appointment can be made [here](#). Students who need COVID-19 vaccines can also get vaccinated at the Student Center. More information about vaccination is available [here](#). Research has shown that people who get vaccinated have a lower risk of being infected and hospitalized. Therefore, it is strongly encouraged that students attending this class take the vaccination.

Also note that the University has launched the [Cougar Vaccination Incentive Program](#) and the [Cougar Testing Incentive Program](#) through September 30. Students who

are fully vaccinated can participate in the Cougar Vaccination Incentive Program to receive \$50 in ShastaBUCKS, which can be used via Cougar Card at on-campus dining locations, the Campus Store, vending machines and select off-campus merchants. Randomly selected participants will be eligible for additional incentives with respect to tuition and fees. Finally, Cougar Testing Incentive Program will offer a \$2 credit for each test. The credit can be applied to Cougar Cash or ShastaBUCKS.

## **University Policies and Resources**

### **Academic Integrity**

Students are expected to apply the highest ethical standards in completing home assignments. They should familiar themselves with the University's policies at <http://www.uh.edu/academic-honesty-undergraduate> and <http://www.uh.edu/provost/policies/honesty/>. In this course, students are allowed to complete assignments in small groups as long as everyone participates equally and submits their own work. Plagiarism can be defined as taking someone else's work or ideas and passing them off as your own. This includes copying a classmate's solution to a problem. Students found to have plagiarized in an assignment will receive a zero on that assignment.

### **Statement on Disabilities**

The Americans with Disabilities Act (ADA) is a federal law that provides comprehensive protections for individuals with disabilities, including reasonable academic accommodations. Any student in this class who has a disability that may prevent him or her from fully demonstrating his or her abilities should personally notify me of the need for accommodations and is responsible for contacting the Center for Students with Disabilities. For more information, including documentation requirements, a list of available academic support services, and test administration policies, please visit <http://www.uh.edu/csd/>.

### **Statement on Counseling and Psychological Services**

Counseling and Psychological Services (CAPS) can help students who are struggling with managing stress, adjusting to college life, or feeling sad and hopeless. You can contact CAPS at 713-743-5454 ([www.uh.edu/caps](http://www.uh.edu/caps)) during and after business hours for routine appointments, or if you or someone you know is in crisis. Also note that

the University of Houston provides the “Let’s Talk” program that makes convenient drop-in consultation service available around campus. For more details, see [http://www.uh.edu/caps/outreach/lets\\_talk.html](http://www.uh.edu/caps/outreach/lets_talk.html).

## Course Calenda

### Week 1: Course Overview

1. August 24 (Tuesday): Course Overview
2. August 26 (Thursday): Getting Started with R
  - Installing R and RStudio on your laptop

### Week 2: Making Sense of Data

1. August 31 (Tuesday): Lecture
  - Levin and Stephan (2014), Chapter 1
2. September 2 (Thursday ): Lab

### Week 3: Describing and Visualizing Data

1. September 7 (Tuesday): Lecture
  - Levin and Stephan (2014), Chapter 2&3
2. September 9 (Thursday): Lab

### Week 4: Probability and Statistical Distributions

1. September 14 (Tuesday): Lecture
  - Levin and Stephan (2014), Chapter 4&5
2. September 16 (Thursday): Lab

### Week 5: Sampling Distributions

1. September 21 (Tuesday): Lecture
  - Levin and Stephan (2014), Chapter 6

2. September 23 (Thursday): Lab

### **Week 6: Fundamentals of Hypothesis Testing**

1. September 28 (Tuesday): Lecture

- Levin and Stephan (2014), Chapter 7

2. September 30 (Thursday): Lab

### **Week 7: Hypothesis Testing with Numerical Data**

1. October 5 (Tuesday): Lecture

- Levin and Stephan (2014), Chapter 8

2. October 7 (Thursday): Lab

### **Week 8: Hypothesis Testing with Categorical Data**

1. October 12 (Tuesday): Lecture

- Levin and Stephan (2014), Chapter 9

2. October 14 (Thursday): Lab

### **Week 9: Correlation**

1. October 19 (Tuesday): Lecture

- Field et al. (2012), Chapter 6

2. October 21 (Thursday): Lab

### **Week 10: Simple Linear Regression**

1. October 26 (Tuesday): Lecture

- Levin and Stephan (2014), Chapter 10

2. October 28 (Thursday): Lab

### **Week 11: Multiple Regression**

1. November 2 (Tuesday): Lecture

- Levin and Stephan (2014), Chapter 11
- Brambor, T., Clark, W. R., & Golder, M. (2006). Understanding interaction models: Improving empirical analyses. *Political Analysis*, 14(1), 63-82.

2. November 4 (Thursday): Lab

### **Week 12: Regression Diagnostics**

1. November 9 (Tuesday): Lecture

- Monogan (2015), Chapter 6
- Fox (1991), *Regression Diagnostics: An Introduction* (pp.10–61)

2. November 11 (Thursday): Lab

### **Week 13: Regression on Binary Outcomes**

1. November 16 (Tuesday): Lecture

- Field et al. (2012), Chapter 8

2. November 18 (Thursday): Lab

### **Week 14: Thanksgiving Holiday (No Class Meeting)**

### **Week 15: Time Series Analysis**

1. November 30 (Tuesday): Lecture

- Monogan (2015), Chapter 9

2. December 2 (Thursday): Lab

### **Week 16: Final Exam (No Class Meeting)**

Note: This syllabus may be subject to change in the future.