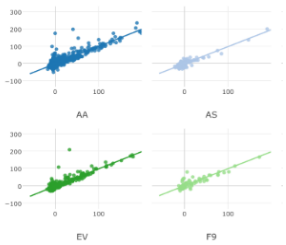

SOC 570A

Social Statistics I

We. & Fi., 4:00p - 5:15p

Instructor:
Diego F. Leal
Assistant Professor of Sociology
University of Arizona
Social Sciences Building, Room 433
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Office Hours: by appointment

Course description: This course is the first building block of the graduate statistics sequence in the School of Sociology. This applied stastics class is designed to accomplish two tasks. First, the course aims to introduce students to statistical reasoning, the principles of statistical inference, and computer programming using specialized statistical software. Second, the course seeks to introduce students to the use and logic of (least-squares) linear regression, the bedrock of statistical inference in the social sciences. The first half of the course focuses on the basics of statistical programming, probability, and hypothesis testing. The second half of the course deals with basic and advanced considerations about the linear regression model. The focus of this course will be on hands-on data analysis and the application of statistical methods. By the end of the course, students will be able to understand, use, and critically assess the linear regresison model in the context of cross-sectional data.

Prerequisite(s): None.

Course format and teaching methods: Live in person seminar.

Slides and required textbooks: This class uses detailed lecture slides that I have developed over the years. I encourage you to think of these slides as primary reading material for this class. Beyond the lecture slides, these are the required textbooks:

- Fox, John. 2016. *Applied Regression Analysis and Generalized Linear Models.* 3rd Edition. Los Angeles: Sage. `https://bit.ly/3kE6unQ`
- Imai, Kosuke. 2018. *Quantitative Social Science: An Introduction.* Princeton: Princeton University Press. `https://bit.ly/3vHxIjL`

Other required readings: A few weeks include primary readings from the books listed below. PDF copies of the relevant chapters will be provided on `D2L`. The articles assigned as applications can all be found through the University of Arizona Library's journal collection.

- Agresti, Alan. 2018. *Statistical Methods for the Social Sciences.* 5th Edition. London: Pearson Education. (either the U.S. or the Global Edition will work).
- Moore, David S., George P. McCabe and Bruce A. Craig. 2021. *Introduction to the Practice of Statistics.* 10th Edition. New York: W.H. Freeman Company.
- Walpole, Ronald E., Raymond H. Myers, Sharon L. Myers and Keying Ye. 2017. *Probability and Statistics for Engineers and Scientists.* 9th Edition. Boston: Prentice Hall.

Optional readings: These books are useful secondary references.

- Aronow, Peter M. and Bejamin T. Miller. 2019. *Foundations of Agnostic Statistics.* 1st Edition. Cambridge: Cambridge University Press.
- Fox, John and Sanford Weisberg. 2018. *An R Companion to Applied Regression.* 3rd Edition. Los Angeles: Sage.
- Griffiths, William E., Carter Hil, Geirge G. Judge. 1993. *Learning and Practicing Econometrics.* 1st Edition. New York: Wiley
- Matloff, Norman. 2011. *The Art of R Programming. A Tour of Statistical Software Design.* 1st Edition. San Francisco: no starch press.

Software: This class is based on `R`, a programming language for statistical computing. All problem sets and the final exam must be completed in `R`. This software is freely available under the GNU General Public License. We will also be using `RStudio` as the integrated development environment (IDE) for `R`.

Learning outcomes: At the completion of this course, students will be able to:

1. Recognize and understand key assumptions behind basic statistical methods in the social sciences.
2. Understand and interpret results published in peer-reviewed journals in Sociology and other social sciences.
3. Understand the limitations and assumptions of, as well as use, least-squares linear regression.
4. Use statistical software to analyze data.

Grade distribution:

5 problem sets (15 points each)	75%
Final exam	25%

Letter grade distribution:

>= 93.00	A	73.00 - 76.99	C
90.00 - 92.99	A-	70.00 - 72.99	C-
87.00 - 89.99	B+	67.00 - 69.99	D+
83.00 - 86.99	B	63.00 - 66.99	D
80.00 - 82.99	B-	60.00 - 62.99	D-
77.00 - 79.99	C+	<= 59.99	F

Problem sets:
Problem sets are always due at 11:59p on the day noted in the table on page 4. Problem sets will be uploaded to `D2L`. If you prefer to write the solutions to the problem sets by hand (instead

of typing them in, say, `Word` or LaTeX) please do so with very clear handwriting. Scan your files, then upload them to `D2L` like everyone else. Problems sets will always require a companion `R` script.

Final exam:
Final exam will be in-home and will require you to be able to use `R` to both clean and analyze data. I will provide the data set and specific guidelines to analyze the data. In terms of format, the final exam must look like a standard quantitative paper (i.e., intro + theory & hypotheses + data + results + discussion & conclusions) and must have a companion `R` script. The option to do a replication of a published article of your choosing is also available. If this is something you would like to do, you would have to ensure you have access to the data set used in the article you want to replicate BEFORE week 12. If you decide to do a replication, you will have to write a thorough replication memo (I will provide examples to you) including performing standard diagnostics and, whenever possible, extending the original results by including at least one more variable of theoretical interest. Have a meeting with me BEFORE week 8 if you are thinking about doing a replication.

Class Schedule:
The class schedule on page 4 points to the required readings in a given week. The weekly material might change as it depends on the progress of the class. However, you must keep up with the readings. It is your responsibility to stay informed about our current place in the course. Readings must be done before class time that day. I might assign additional substantive supplemental readings throughout the semester.

Course Policies:

- Phones are not allowed as calculators. Please make sure you bring an actual calculator to every class.
- Collaboration in order to solve and discuss the problem sets is allowed and highly encouraged. However, each student is required to send an individual file showing their own individual work.
- A minimum grade of C is required in this course to progress to SOC 570B.

Academic honesty policy:
You are expected to practice the highest possible standards of academic integrity. Any deviation from this expectation will result in a minimum academic penalty of you failing the assignment, and will result in additional disciplinary measures. This includes improper citation of sources, copying another student's work, and any other form of academic misrepresentation.

Online submission of a problem set implies that the student has complied with the Academic Honesty Policy in that work. Refer to the full text of the Code of Academic Integrity here.

Late submission & attendance policy:
In the absence of a valid excuse, late homework will be accepted, but a letter grade will be reduced for each class day late. See the University policy regarding excusable absences and class attendance here.

Diversity policy:
I have attempted to avoid conflicts with major religious holidays. If, however, I have inadvertently scheduled an exam or major deadline that creates a conflict with your religious obser-

Week	Content	Readings
Week 1	• Aug. 24, Welcome & intro to `R` 1 • Aug. 26, Intro to `R` 2 & review of basic descriptive stats	Imai, Ch. 1.1 - 1.4 & 2.1 - 2.2
Week 2	• Aug. 31, Intro to `R` 3 & review of basic descriptive stats • Sep. 02, Intro to `R` 4, measurement & randomization	Imai, Ch. 3.1 - 3.8
Week 3	• Sep. 07, Intro to probability • Sep. 09, Intro to probability Cont'd • **Sep. 09, Problem Set 1: R programming**	Imai, Ch. 6.1 - 6.2
Week 4	• Sep. 14, Random variables • Sep. 16, Random variables Cont'd	Imai, Ch. 6.3
Week 5	• Sep. 21, Sampling distributions • Sep. 23, Sampling distributions Cont'd	Imai, Ch. 6.4 Walpole et al., Ch. 8
Week 6	• Sep. 28, Estimation • Sep. 30, Estimation cont'd • **Sep. 30, Problem Set 2: Probability & Rnd Vars**	Imai, Ch. 7.1
Week 7	• Oct. 5, Testing • Oct. 7, NO CLASS. Honors Convocation	Imai, Ch. 7.2
Week 8	• Oct. 12, Testing cont'd • Oct. 14, Chi-squared methods	Agresti, Ch. 8.1 - 8.4
Week 9	• Oct. 19, Intro: Linear Least-squares Regression (LLR) • Oct. 21, Intro: LLR cont'd • **Oct. 19, Problem Set 3: Estimation & Testing**	Fox, Ch. 5
Week 10	• Oct. 26, LLR: Interpreting regression outputs • Oct. 28, LLR: Statistical inference for regression	Fox, Ch. 6.1 - 6.3
Week 11	• Nov. 02, LLR: Dummy-variables & ANOVA • Nov. 04, LLR: Dummy-variables & ANOVA cont'd	Fox, Ch. 7.1 - 7.4 & 8.1
Week 12	• Nov. 09, LLR: Gauss-Markov Theorem & unusual data • Nov. 11, NO CLASS. Veteran's Day • **Nov. 09, Problem Set 4: Basics of LLR**	Fox, Ch. 9.1 - 9.3.2 & 11.1 - 11.3
Week 13	• Nov. 16, LLR: Unusual and influential data • Nov. 18, LLR: Nonlinearity & collinearity	Fox, Ch. 11.4 - 11.7 & 12.1 - 12.2.1 & 12.3 - 12.4.2 & 13.1
Week 14	• Nov. 23, Partial corr, comparing LLRs, cross-validation • Nov. 25, NO CLASS. Thanksgiving	Agresti, Ch. 11.5-11.7 & Fox, Ch. 22.1 & 22.3
Week 15	• If time allows, we will explore permutation methods: • Nov. 30, The bootstrap & permutation testing • Dec. 02, LLR & the quadratic assignment procedure • **Nov. 30, Problem Set 5: Advanced LLR**	Moore et al., 14 and Leal et al. 2019 and Kitts & Leal 2021 and Chatagnier 2012
Week 16	• Dec. 7, Getting ready for SOC 570B: concepts & code • TBD. Final Exam	

vances, please let me know as soon as possible so that we can make other arrangements.

Similarly, if English is not your first language and you feel like that could interfere with your ability to do well in this course please do let me know. I am confident I can provide resources and guidance to help you succeed.

Accessibility and accommodations:

At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, `https://drc.arizona.edu/`) to establish reasonable accommodations. Please let me know of any disabilties you may have before or during the semester. The earlier you communicate them to me, the easiest it will be for us to handle them.

Nondiscrimination and anti-harassment policy:

The University of Arizona is committed to creating and maintaining an environment free of discrimination. In support of this commitment, the University prohibits discrimination, including harassment and retaliation, based on a protected classification, including race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, or genetic information. For more information, including how to report a concern, please see: `http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy`

Graduate student resources:

See the University of Arizona's Basic Needs Resources page: `https://caps.arizona.edu/mental-health-directory`

Subject to change notice:

Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by me.

Articles referenced in the syllabus:

Chatagnier, Tyson. 2012. "The Effect of Trust in Government on Rallies' Round the Flag," *Journal of Peace Research* 49(5):631–645.

Kitts, James A. and Diego F. Leal. 2021. "What is(n't) a Friend? Dimensions of the Friendship Concept among Adolescents," *Social Networks* 66: 161-170.

Leal, Diego F., Anthony Paik and Steven Boutcher. 2019. "Status and Collaboration: The Case of Pro Bono Network Inequalities in Corporate Law," *Social Science Research* 84: 102325.