BAX-441 – 002 – Statistical Exploration and Reasoning

TERM: Fall 2019

LECTURES: Saturday: 9:30 a.m. – 12:20 p.m.
San Francisco

INSTRUCTOR: Mehul Rangwala mrangwala@ucdavis.edu

OFFICE HOURS: Anytime I am not teaching.

COURSE DESCRIPTION: Students use statistical reasoning and techniques to draw appropriate inferences regarding the meaning of data. Students learn to obtain preliminary insights and form initial hypotheses through exploratory data analysis (EDA). Topics include descriptive statistics, critical statistical thinking, sampling, probability, and basic statistical methods (e.g. OLS). The course also covers empirical strategies for applied micro-econometric research questions that include econometric applications of regressions.

REFERENCE TEXTBOOKS:

1. *Introductory Statistics with R,* 2nd edition by Dalgaard, Peter. Publisher: Springer-Verlag New York.
An electronic copy of the text is available for download at no cost through our library. VPN required. Please follow the link to download the text.

2. *STAT2*
Ann Cannon; George W. Cobb; Bradley A. Hartlaub; Julie M. Legler; Robin H. Lock; Thomas L. Moore; Allan J. Rossman; Jeffrey A. Witmer Second Edition © 2019
ISBN:9781319054076

3. *Statistics for Management and Economics*, 11e
by Gerald Keller. Publisher: Cengage.

4. *Introductory Econometrics: A Modern Approach*, 7th edition by Jeffrey M. Wooldridge.
Publisher: Cengage Learning
ISBN-13: 978-1337558860
ISBN-10: 1337558869

5. *Essentials of Econometrics*, 4th edition by Damodar N. Gujarati and Dawn C. Porter.
Publisher: McGraw Hill
ISBN-13: 978-0073375847
ISBN-10: 0073375845

NOTES AND HANDOUTS: I will upload the notes and in-class exercises on Canvas. It is your responsibility to download the material/exercise files **prior to the start** of each class.

COMPUTER PACKAGE: RStudio.

PEDAGOGICAL APPROACH: The class sessions will be interactive with lectures, discussions, and hands-on exercises. After I introduce a topic, we will work on cases and exercises related to the concepts covered in each class session. A laptop with RStudio installed is required.

GRADING:

Homework (Individual)	30%
Midterm (take-home)	30%
Final Exam (take-home)	40%

Course Objectives:

1. Gain an appreciation for the breadth of statistical topics available to solve complex business problems in real world and your practicum project.

2. Learn to identify correct statistical methods appropriate for business problems under consideration. Interpret the results and convey the interpretations in a non-technical manner to your audience.

3. Learn to use R for statistical analysis.

4. Be able to critically evaluate reports/articles/research containing statistical information.

5. Prepare you for the advanced topics in the MSBA program.

Additional Points and Suggestions:

1. While there will be some focus on mathematical formulas, a significant proportion of time will be spent on intuition behind statistical techniques, analyzing *when* a particular technique should be used, and interpreting/understanding the results from the computer outputs. It is common for analysts to misapply statistical techniques to research problems. So, it is very important to be able to identify and choose correct methods to solve research problem under study.

2. Topics not covered in the class (if there are any, due to lack of time) will be covered offline using **recorded** Zoom sessions. If you cannot attend, please view the recording.

3. The course textbooks are for reference and should be read. However, this course will cover topics beyond those given in the textbooks. My lectures may not always follow the chapters in the text. For the most part, my lecture notes and the in-class exercises will be your key to complete the assignments and exams.

4. If you have difficulty with any material, please do not hesitate to contact me. My topmost priority is to ensure that you are successful in understanding of the material and prepare you for the rigorous coursework in the program.

5. The midterm and final exams will be computer-based and take-home. The formats of the midterm and final exams may be varied. Please note that the purpose of the exams is to assess your understanding of the concepts and your ability to apply concepts discussed in the class. The questions will involve problem sets and cases that will require statistical analysis. You will be required to perform quantitative and qualitative analyses for these cases.

6. Real learning has happened when you can explain the statistical concepts in your own words to people who don't understand statistics.

Academic Honor Code:

All students are expected to adhere to the University of California, Davis' Code of Conduct as noted here: http://sja.ucdavis.edu/files/cac.pdf.

Tentative Schedule on the next page

Schedule (Tentative)

This is a **tentative** schedule. It may be adjusted according to the pace of the class.

	Date	Assignments Due	Topics Covered
1	Saturday, September 28		Estimation • Confidence Interval Estimation of Mean, Proportion, and Variance Sample Size Determination • For Mean and Proportions
2	Saturday, October 5	Homework 1	Principles of Hypothesis Testing • Type I and Type II Error Analysis • Hypothesis Testing Process • Significance level and p-values One-Sample Hypothesis Testing • For population mean • For population proportion • For population variances
3	Saturday, October 12	Homework 2	Two-Sample Hypothesis Testing • For population mean • For population proportion • For population variances Power Calculations • Power of Statistical tests
4	Saturday, October 19	Homework 3	Analysis of Variance (ANOVA) • One-Factor ANOVA • Post Hoc Analysis • Randomized Block Design • Two-Factor ANOVA
5	Saturday, October 26	Homework 4	Chi-Squared Tests • Goodness of Fit test • Test of Independence Nonparametric Tests • Wilcoxon Rank Sum Test • Kruskal-Wallis Test • Friedman Test • Sign Test • Spearman Rank Correlation Test
6	Saturday, November 2	Take-Home Midterm Exam Due	Multiple Regression 1

	Date	**Assignments Due**	**Topics Covered**
7	Saturday, November 9		Multiple Regression 2
8	Saturday, November 16	Homework 5	Model Building 1
9	Saturday, November 23		Model Building 2
10	Saturday, December 7	Homework 6	Time Series Analysis Introduction
11	Saturday, December 14	Take-Home Final Exam Due	