BAX-441 – 001 – Intermediate Statistics (Statistical Exploration and Reasoning)

TERM: Fall 2021

LECTURES: Friday: 12:00 p.m. – 2:50 p.m.

INSTRUCTOR: Mehul Rangwala mrangwala@ucdavis.edu

OFFICE HOURS: Wednesdays from 7:00 pm – 8:00 pm

COURSE DESCRIPTION: Students use statistical reasoning and techniques to draw appropriate inferences regarding the meaning of data. Topics include critical statistical thinking, nonparametric tests, simple and multiple regression, diagnostics, and fundamental principles of model building and its techniques. The course covers empirical strategies for applied micro-econometric research questions that include econometric applications of regressions.

REFERENCE TEXTBOOKS:

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

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

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

4. *A Practical Guide to Using Econometrics*, 7th edition by A. H. Studenmund. Publisher: Pearson

NOTES AND HANDOUTS: I will upload the notes and in-class exercises on Canvas.

COMPUTER PACKAGE: RStudio.

PEDAGOGICAL APPROACH: The class sessions will be interactive with lectures, discussions, and hands-on exercises/code walkthroughs. 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)	50%
Midterm (take-home)	10%
Final Exam – Part 1 (take-home)	20%
Final Exam – Part 2 (Conceptual)	20%

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. The course textbooks are for reference and majority of the content will be drawn from the texts listed. 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.

3. 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.

4. 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.

5. 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	9/24/2021		Chi-Squared Tests • Goodness of Fit test • Test of Independence
2	10/1/2021	Homework 1 based on Nonparametric tests and Chi-Squared tests	Basic Ideas of Linear Regression • The Meaning of Regression • The Population Regression Function • The Sample Regression Function • Special Meaning of the Term "Linear" • Method of Ordinary Least Squares • Properties of OLS Estimators and Gauss-Markov Theorem • Inference in Simple Linear Regression
3	10/8/2021		Multiple Regression • Interpreting parameter estimates • Adjusted R-squared • Prediction • Partial F-test
4	10/15/2021	Homework 2 based on Fundamentals of Linear Regression	Functional Forms • Polynomial • Reciprocal • lin-log • log-log • log-lin
5	10/22/2021	Homework 3 based on Functional Forms	Multicollinearity • Detecting and Remedying Dummy Variables – 1 • ANOVA and ANCOVA models
6	10/29/2021	Take-Home Midterm Exam Due	Dummy Variables – 2 • Interaction Effects • Seasonal Analysis • Semilog Regressions

	Date	Assignments Due	Topics Covered
7	11/5/2021	Homework 4 covering multicollinearity and dummy variables	Regression Assumptions • The Classical Assumptions • Normality • Heteroscedasticity • Autocorrelation

8	11/12/2021	Homework 5 covering regression assumptions	• Regression Assumptions (continued)
			• Model Building
			  ○ Model Selection Criteria and Tests
			  ○ Variable Selection Techniques

9	11/19/2021	Homework 6 covering Model Building	Special Topics in Regression – 1
10	12/3/2021		Special Topics in Regression – 2
	12/4/2021 NO CLASS	**Homework 7 covering Special Topics in Regression**	**NO CLASS**
11	12/10/2021	Final – Part 1 (Comprehensive)[1] Exam Due Final Exam – Part 2 (Conceptual)	

[1] Will include some topics from BAX-400