BAX-441 – Statistical Exploration and Reasoning

TERM: Fall 2017

LECTURES: Saturdays: 1:00 p.m. – 5:00 p.m.
San Francisco
September 30, October 14, 28, November 11, December 2, December 16 (Final)

INSTRUCTOR: Mehul Rangwala
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OFFICE HOURS: In-person – Saturdays: 5:00 p.m. – 6:30 p.m. (or later if needed)
I encourage you to use this time to ask questions or review any part of the material/homework you are having difficulty with. If this time is not convenient, then a separate appointment can be arranged for a meeting either in-person or over the phone.

On the phone – any weekday evenings with prior appointment.

I'm pretty approachable so, even outside office hours, please feel free to contact me any time if you have any questions.

COURSE DESCRIPTION: Introduction to statistical reasoning and inference extraction from large datasets. 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).

VISION: Introduce students to practical ways in utilizing a variety of descriptive and inferential statistics methods to gain insights from data, make informed decisions, and maximize business value. Through this course, students will build a solid foundation for the advanced material covered in the BAX442 and other related courses in the program and gain confidence to successfully complete the practicum project.

TEXTBOOK: *Introductory Statistics with R*, 2nd edition by Dalgaard, Peter. Publisher: Springer-Verlag New York.

APPROX. MATERIAL TO BE COVERED: NOTES AND Chapters 1, 2, 3, 4, 5, 6, 8, 9, and 11

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: R and 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 R and RStudio installed is required.

GRADING:

Homework	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 rest of the coursework in the MSBA degree program.

Additional Points and Suggestions:

1. This is NOT a course in R. Focusing on and getting wrapped up with R will deviate us from our learning objectives. R is like an ocean. It contains zillions of packages. It will not be our intent to utilize all the available statistical packages. Instead, we will use R as a means to perform data and statistical analysis.

2. 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.

3. The course textbook is for reference and should be read. However, this course will cover topics beyond those given in the textbook. 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.

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, 9/30		• Difference between descriptive and inferential statistics. • Types of data and levels of Measurements. • Sampling Methods. • Descriptive Statistics – numerical and graphical techniques. • Evaluate and analyze relationships between two variables.
2	Saturday, 10/14	Homework 1	• Design of Experiments. • Concepts of random variable and probability distributions. • Discrete Probability Distributions (Binomial, Poisson, Hypergeometric). • Continuous Probability Distributions (Normal Distribution).
3	Saturday, 10/28	Homework 2	• Sampling Distributions and the Central Limit Theorem. • Point and Confidence Interval Estimation techniques. • Basics of Hypothesis Testing. • One-Sample t-test for means.
4	Saturday, 11/11	Midterm Exam (Take-home)	• One-Sample test for proportions. • Two-Sample Hypothesis testing for means, variances, and proportions. • Two-Sample Hypothesis testing for nonparametric data.
5	Saturday, 12/2	Homework 3	• Correlation and Simple Linear Regression. • Point and Interval Predictions. • Introduction to Multiple Regression.
6	Saturday, 12/16	Final Exam (Take-home)	