

ISOM 5510 Data Analysis

Course Outline

Contact Information

Professor Inchi Hu, Office: Rm 4076, Phone: 2358-7734, email: imichu@ust.hk
Office hours: By appointment

Ms Di Song, Teaching Assistant, email: dsongac@connect.ust.hk

Course Materials

Textbook : “*Statistics for Business- Decision Making and Analysis*” by Stine and Foster
Class notes, and other information are posted on the course website on Canvas
JMP software

Grading Policy

Class participation	~5%
Three quizzes	20% [Each quiz consists of five multiple choice questions]
Group project	25%
Final Exam	50%

Course Description and Objectives

“The ability to take data - to be able to understand it, to process it, to extract value from it, to visualize it, to communicate it – that’s going to be a hugely important skill in the next decades ... Managers need to be able to access and understand the data themselves” Hal Varian, Chief Economist, Google.

This course equips you with concepts and methods that constitute a framework of effective data analysis. Effective data analysis begins with asking the right questions then connects the questions to appropriate data. Through numerous business data examples/cases, we will demonstrate the whole process to reach its final goal – confirming the answers found are not short-lived but long-lasting. Through the process, you also learn fundamental results useful in your other courses. By the end of the course, you will be ready to conduct data-driven decision-making as a manager, and hopefully data-driven business innovation as well.

Course Learning Outcomes

- Know how to present the data to reveal insightful information
- Acquire necessary knowledge to manage risk
- Calibrate and overcome imperfect information in the data
- Forecast accurately with historical data

Course Schedule

Session	Topic	Content	Activities
I Aug. 29	Module 1 Data and Variation	<ul style="list-style-type: none"> • GMAT example: graphical and numerical tools • Stock return example: Normal distribution and empirical rule • CEO compensation example: log transformation and comparison boxplot 	
II Sep. 5	Module 2 Probability Models Module 3 Variance and Volatility	<ul style="list-style-type: none"> • Digital option example: random variable, probability distribution, expected value, and variance • Normal distribution as a model • Alternative model: t distribution • Investment game: a multi-period simulation experiment 	Quiz 1 Experiment 1
III Sep. 12	Module 4 Association & Dependence Module 5 Covariance and Portfolio	<ul style="list-style-type: none"> • Amazon.com example: contingency table and chi-square statistics • Option package example: probability table, marginal, and joint probabilities • A health-care example: Bayes rule • Statistical analysis of portfolio • Hang Seng Index example: from simple to optimal portfolio 	Group project
IV Sep. 19	Module 6 Sampling and Sampling Distribution	<ul style="list-style-type: none"> • The population-sample paradigm: sampling bias and hypothetical population; simple random sampling and i.i.d. sample • A class experiment: sampling distribution and central limit theorem • Motor shaft quality control example 	Quiz 2 Experiment 2
V Sep. 26	Module 7 Standard Error and Confidence Interval Module 8 Statistical Hypothesis Testing	<ul style="list-style-type: none"> • The key to confidence : standard error • M&M class experiment analyzed • HSBC stock example: confidence interval, prediction interval, and margin of error • Click fraud case • Expansion decision example: statistical hypotheses, test statistic, and p-value • Stock return example: two-sided hypothesis • Car leasing example: two-sample t-test • Post-merger integration example: paired t-test 	Role-playing game

<p>VI Oct. 3</p>	<p>Module 9 Fitting Equation to Data</p> <p>Module 10 Simple Regression Model (SRM)</p>	<ul style="list-style-type: none"> • Diamond ring example: fix cost versus variable cost • Display space example: nonlinear relationship and diminishing marginal return • Optimal pricing example: a constant elasticity model • Assessment of prediction accuracy and simple regression model • Separation of signal from noise: Fitted values and residuals • Prediction error: root mean square error (RMSE) • Model checking examples 	<p>Quiz 3</p>
<p>VII Oct. 10</p>	<p>Module 11 Inference about SRM</p> <p>Module 12 Introduction to Multiple Regression</p>	<ul style="list-style-type: none"> • Review of inference for the mean • Sampling distribution and standard error in regression • Diamond ring example revisited: inference about linear relationship, R^2 and performance index • Capital asset pricing example: beta, systematic and specific risks • Product design example: partial and marginal regression coefficients • Market segmentation example: proxy effect • Multiple regression model 	
<p>VIII Oct. 17</p>	<p>Final Examination</p>	<p>Covers modules 9 – 12 Close books and notes, allow one A4 size paper as cheat-sheet</p>	