香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

ISOM5510 Data Analysis (L4 & L5)
Fall Semester 2021/22

Course Outline

Instructor	Dr. Jason MW HO Visiting Assistant Professor of ISOM
Office Location	LSK4082B
Office Hours	By appointment
Email	imjasonho@ust.hk
Phone	(852) 3469 2989
Website	https://facultyprofiles.ust.hk/profiles.php?profile=jason-man-wai-ho-imjasonho
Teaching Assistant	Mr. Serafim PETROV
Email	impetrov@ust.hk

Class Schedule and Location

Class L4: LSKG001, 1400 – 1720, every Saturday, 28 Aug – 16 Oct 2021
Class L5: LSKG003, 1400 – 1720, every Friday, 27 Aug – 8 Oct 2021, **AND** 16 Oct 2021 (Sat), 1400 - 1720

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 Materials

Textbook (**E-copy provided**): ***Statistics for Business Decision Making and Analysis*** (2nd ed), Robert Stine, Dean Foster, Pearson (2014)
Class PowerPoints, and other information posted on the course website on Canvas

Assessment

Class participation 5%
Three quizzes 30% [Weeks 3, 4, and 6]
Final Exam 65% [on **16 Oct 2021 (Saturday)**, 1400 – 1600]

Details of quizzes:

1. Time: **first 15 minutes** of the designated lectures in weeks 3, 4, and 6
2. Scope: materials delivered after the previous quiz
3. Closed book
4. Ten multiple choice questions, to be completed on course website on Canvas using your own laptop

Academic Integrity

Without academic integrity, there is no serious learning. Thus, you are expected to hold the highest standard of academic integrity in the course. No cheating, plagiarism will be tolerated. Anyone caught cheating, plagiarism will fail the course. Please make sure adhere to the HKUST Academic Honor Code at all time (see http://www.ust.hk/vpaao/integrity/).

Course Schedule

Week/Date	Topic	Content	Activities
1 27 or 28 Aug	Module 1 Data and Variation	• Concierge waiting time example: graphical and numerical tools • Stock return example: normal distribution and empirical rule • CEO compensation example: skewness and log transformation	• Normal return demo
2 3 or 4 Sep	Module 2a Association and Dependence	• Natural gas consumption example: covariance and correlation • Amazon.com example: contingency table, marginal, conditional, and joint distributions • Orange Arrow delivery example: Simpson's paradox	• Correlation demo
	Module 2b Probability	• Probability framework: long-run frequency, tree diagram, total law of probability • Diagnostic test example: Bayes' rule	• Monte Hall problem game
3 10 or 11 Sep	Module 3a Probability Models	• Day trader example: random variable, probability distribution, expected value, and variance • Value at risk example: normal distribution as a model • Alternative model: t distribution	• **Quiz 1** • Normal distribution demo
	Module 3b	• Portfolio example: joint probability distribution	• Covariance and

	Covariance and Portfolio		correlation of returns demo • Portfolio return demo
4 17 or 18 Sep	Module 4 Sampling and Sampling Distribution	• The population-sample paradigm: sampling bias, hypothetical population, simple random sampling, and iid sample • Credit card transaction example: sampling distribution and central limit theorem • GPS chip example: control chart	• **Quiz 2** • Sampling distribution demo • CLT demo
5 24 or 25 Sep	Module 5a Standard Error and Confidence Interval Module 5b Statistical Hypothesis Testing	• Key to confidence: standard error • Credit card launch example: confidence interval for mean and for proportion, margin of error, sample size determination • Expansion decision example: statistical hypothesis, test statistic, and p-value • Membership renewal example: two-sample z-test for proportions • Comparing two diets example: two-sample t-test	
6 1 or 2 Oct	Module 6 Fitting Equation to Data	• Diamond ring example: fixed cost versus variable cost, properties of residuals, root mean square error (RMSE) • Car mileage example: curved pattern, transformation • Grocery sales and advertisement example: diminishing marginal return • Optimal pricing example: a constant elasticity model	**Quiz 3**
7 8 or 9 Oct	Module 7 Simple Linear Regression	• Compensation and sales example: standard error, sampling distribution, model assumption checking • Franchise outlet example: inference of regression coefficients • Managing natural resources example: confidence interval, prediction interval • Capital asset pricing model example: systematic risk vs unsystematic risk	
8 16 Oct	**Final Examination**	Covers all modules (with emphasis on Modules 6 &7); Closed book	