ISOM 1500 Insightful Decisions, Fall 2024

Department of Information Systems, Business Statistics and Operations Management

COURSE: ISOM1500 Insightful Decisions (3-0-0:3)

This course will create a link between learning of the students and real life problems that can be solved using quantitative methods and decision models. By actively involving students to discover real, interesting applications and to apply logic and reason to process and interpret data for decision making, they will change their attitude toward quantitative models and recognize the flaws and insights of such decisions. The course can be further developed and improved as the student's collection of real life, social issues, and high impact decisions continues to grow through the completion of group projects. The course will be delivered in a blended learning format.

Most students, even with a limited background in math and statistics, should be able to handle them without much difficulty. We intend to cover many decision models and approaches without getting into any advanced and difficult computation. The structure of the course will also allow the students to learn from each other in class discussions and activities; i.e., we will create an opportunity for them to discover the right approaches to decision making through real life problems. Those topics, such as probability, heuristics, and sensitivity analysis, are only introduced as the basic decision-making tools.

INSTRUCTOR: Prof. Suri Gurumurthi (imsuri@ust.hk)

Office: *LSK 4016A* Phone: *34692554*

Class meeting times: *Tuesdays @Room4582*

TAs: Kenrick Yeung (kenrickyeung@ust.hk) and Victoria Zhu (imzlzou@ust.hk)

Office: *LSK 4065* Office Hours:

L1: 9:00-10:20 AM (TA: Kenrick)

L4: 12:00-1:20 PM (TA: Kenrick)

L3: 1:30-2:50 PM (TA: Victoria)

L2: 3:00-4:20 PM (TA: Victoria)

CILO:

(1) Apply critical thinking frameworks and processes to examine social and business problems, evaluate potenti solutions, and to develop actionable decisions;

(2) Learn how to avoid and correct common decision errors that occur because of faulty assumptions or flawed decision processes;

(3) Identify and apply quantitative methodologies to the process of solving complicated social and business pro

(4) Use computer spreadsheets effectively for analyzing data and presenting the conclusions.

REFERENCE TEXT:

Online content in the form of Canvas Modules posted on canvas.ust.hk.

GRADING POLICY:

Final course grade will be determined by the following criteria and point distribution:

Class Participation	13 (3% to top-up)
Canvas Reflections (Discussions)	10
Midterm Exam (open slides, open materials)	30
Final Exam (open slides, open materials)	40
Canvas Quizzes	10
TOTAL	**103** (3% to top-up)

Note: No makeup will be given for the midterm exam. If you miss the midterm exam for a valid (say medical emergency) reason approved by the instructor, a more comprehensive final exam will be weighted at 70% of the course grade instead. Your participation points are partly determined by in-class exercises/quizzes and other participation each week (total 13 points). **Excellent class discussion and questions raised or answered, will also contribute to the class participation grade. Your class participation grade includes 3% points to top-up your overall class performance.**

COURSE GRADE:

In determining the final course grade, your instructor will consider the following targets.

A	90-100
B	80-90
C	70-80
D	60-70
F	Below 60

ACADEMIC INTEGRITY:

Students at HKUST are expected to observe the Academic Honor Code at all times (see here for more information). Zero tolerance is shown to those who are caught cheating on the assignments or exam. Any act of cheating in this course will result in a XF grade for the course. This XF grade will stay with your record until graduation. If you receive another XF or X grade, you will be dismissed from the University.

BLENDED LEARNING:

This course will follow a blended learning format. Blended learning involves the use of classroom lectures, technology in the form of online Canvas tools, and out of class self-study to deliver effective and comprehensive learning. Practically what this means is that we will meet for an 80 minute lecture once per week per section. The time we have saved for the other lecture, will be used by students to absorb content delivered online via Canvas tools and to perform preparatory exercises in anticipation of the week's lecture. We will also use Canvas to complete assignments and to provide feedback on assignments. Blended learning, in my experience only works when we understand that there is greater emphasis on self-study and preparation prior to the lecture (and sometimes after the lecture also). **Recognizing this crucial point will lead to better performance throughout and at the end of the course.**

COURSE MAP:

COURSE OUTLINE & WEEKLY READINGS

Week 1 Sep 3 Conventional Lecture CILO 1,3	How We Make Decisions (Online asynchronous reading) In-Class Activities: Discussion of common decisions we make every day; versus common decisions we make that are significant and require analytical effort
Week 2 Sep 10 ½ Conventional Lecture + ½ Flipped Classroom CILO 1,2	System 1 vs System 2 decisions; 1. "Thinking fast and slow" examples 2. Differences between System 1 and System 2 3. Classifying System 1 and System 2 decision-making

Week 3 Sep 17 ½ Conventional Lecture + ½ Flipped Classroom CILO 1,2,3	Different Decision and Problem Types; Effective vs Fallacious Decisions In-Class Activities: 1. Define and identify different problem classes 2. Discuss common decision illusions; how people make the same decision error over and over; 4. Discuss the ProACT framework for decision-making 5. Can good decision-making lead to negative outcomes? 6. Online survey to be completed in class.
Week 4 Sep 24 ½ Conventional Lecture + ½ Flipped Classroom CILO 2,3	Critical Thinking Skills in System 1 and System 2 In-Class Activities 1. Discussion of Game Theory and Games 2. Critical thinking examples in interactive (or team) decision-making
Week 5 Oct 1st	National Day Holiday
Week 6 Oct 8 ½ Conventional Lecture + ½ Flipped Classroom CILO 2,3	Analytical Methods: Simple Linear Optimization In-Class Activities 1. Thought Experiments involving Optimization 2. Introduction to Excel Solver

Week 7 Oct 15 ½ Conventional Lecture + ½ Flipped Classroom CILO 2,3	Analytical Methods: Large Scale and Non-Linear Optimization In-Class Activities 1. Applications of Optimization Methods for Social Problems 2. Spreadsheet Modeling and Non-Linear Examples
Oct 22 (Thu)	Midterm Exam Based on Previous Modules Venue: TBD Time: Evening TBD
Week 8 Oct 29 ½ Conventional Lecture + ½ Flipped Classroom CILO 3,4	Decision-Making Under Uncertainty In-Class Activities 1. Discussion of games of chance and concepts 2. How uncertainty can be a perception rather than reality 3. Discussion of basic constructs of decision making under risk
Week 9 Nov 5 ½ Conventional Lecture + ½ Flipped Classroom CILO 2,3	Decision-Making Under Uncertainty In-Class Activities 1. Making one-time decisions under uncertainty 2. Repeated decisions under uncertainty 3. Hedging and insurance decisions

Week 10 Nov 12 ½ Conventional Lecture + ½ Flipped Classroom CILO 2,3	Analytical Methods: Simulation Modeling In-Class Activities 1. Discussion of examples of Random walks 2. Spreadsheet simulation model building
Week 11 Nov 19 ½ Conventional Lecture + ½ Flipped Classroom CILO 3,4	Analytical Methods: Decision Trees In-Class Activities 1. Discussion of an Envelope Game 2. Multi-stage decision-making with recourse
Week 12 Nov 26 ½ Conventional Lecture + ½ Flipped Classroom CILO 1,2,3,4	Big Data and AI: Concepts and Challenges In-Class Activities 1. Identify uses of big data 2. How can we make better decisions with Big Data? 3. Discuss examples of the use of AI/AR/VR 4. Will AI replace human decision-making?