ISOM 1500 Insightful Decisions, Fall 2022

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.

Fall 2022

L1: Mon 9-10:20AM Rm 5620, TA: Jia Jing; imjing@ust.hk

L2: Mon 4-5:50PM Rm 4582, TA: Stacy Deng,imsdeng@ust.hk

L3: Mon 3-4:20PM Rm 4582, TA: Stacy Deng,imsdeng@ust.hk

L4: Mon 1:30-2:50PM Rm 4582, TA: Jia Jing; imjing@ust.hk

Office Hours: By Appointment.

Stacy Deng: Office LSK 4065, Phone: 2358-8746;

Jing Jia: Office LSK 4065, Phone: 2358-8543;

CILO: (1) Apply critical thinking frameworks and processes to examine social and business problems, evaluate potential 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 problems; (4) Use computer spreadsheets effectively for analyzing data and presenting the conclusions.

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

Office: LSK 4040, Phone: 34692554

Office hours: Mon and Wed 12-1:20PM

TEACHING ASSISTANTS Ms. Stacy Deng (imsdeng@ust.hk), Sections L2 and L3

Ms. Jia Jing (imjing@ust.hk) Section L1 and L4

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

GRADING Final course grade will be determined by the following criteria and

POLICY: point distribution:

Class Participation   10 (5% to top-up)

Canvas Reflections (Discussions)   10

Midterm Exam (open slides, open materials)   30

Final Exam (open slides, open materials)   40

Canvas Quizzes 15

   Total   105 (5% to top-up)

Note: No makeup will be given for the midterm exam. If you miss the midterm exam for a valid 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 10 points). **Excellent class discussion and questions raised or answered, will also contribute to the class participation grade. Your class participation grade includes 5% 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 Students at HKUST are expected to observe the Academic Honor
INTEGRITY: 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.
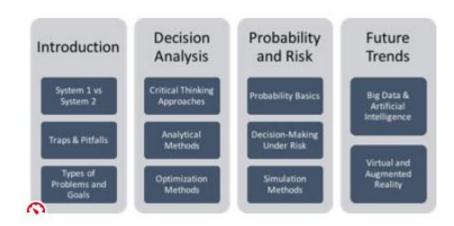
BLENDED

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 and Readings for Each Week

Week 1	
Sept 5	How We Make Decisions (Online asynchronous reading)
Conventional Lecture	In-Class Activities: Discussion of common decisions we make every day; versus co decisions we make that are significant and require analytical effort
CILO 1,3	

Week 2	
Sept 12 (Holiday; no in-person class)	System 1 vs System 2 decisions;
	1. "Thinking fast and slow" examples
Asynchronous Video Lecture to be watched	2. Differences between System 1 and System 2
	3. Classifying System 1 and System 2 decision-making
CILO 1,2	
	Different Decision and Problem Types; Effective vs Fallacious Decisions
Week 3	In-Class Activities:
Sept 19	1. Define and identify different problem classes
½ Conventional Lecture + ½ Flipped Classroom	2. Discuss common decision illusions; how people make the same decision error o over;
	4. Discuss the ProACT framework for decision-making
CILO 1,2,3	5. Can good decision-making lead to negative outcomes?
	6. Online survey to be completed in class.
Week 4	Critical Thinking Skills in System 1 and System 2
Sept 26	In-Class Activities
½ Conventional Lecture + ½ Flipped Classroom	1. Discussion of Game Theory and Games
	2. Critical thinking examples in interactive (or team) decision-making
CILO 2,3	Case Assignment Due
Week 5	Analytical Methods: Simple Linear Optimization
Oct 3	In-Class Activities
½ Conventional Lecture + ½ Flipped Classroom	1. Thought Experiments involving Optimization
	2. Introduction to Excel Solver

CILO 2,3 Week 6 Oct 10 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
Week 7 Week of Oct 17	Midterm Exam (Venue and Time to be Discussed) No class meeting that week
Week 8 Oct 24 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 Oct 31 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 7 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	Analytical Methods: Decision Trees
Nov 14	In-Class Activities
½ Conventional Lecture + ½ Flipped Classroom	1. Discussion of an Envelope Game
CILO 3,4	2. Multi-stage decision-making with recourse
	Big Data and AI: Concepts and Challenges
Week 12	In-Class Activities
Nov 21	1. Identify uses of big data
½ Conventional Lecture + ½ Flipped Classroom	2. How can we make better decisions with Big Data?
CILO 1,2,3,4	3. Discuss examples of the use of AI/AR/VR
	4. Will AI replace human decision-making?
Week 13	Artificial Intelligence and Machine Learning Constructs
Nov 28	In-Class activities: ½ Conventional Lecture + ½ Flipped Classroom
½ Conventional Lecture + ½ Flipped Classroom	1. Supervised versus unsupervised learning 2. Unsupervised learning examples 3. How AI and Machine Learning can enhance individual, and group decision
CILO 1,2,3,4	4. **Drawing boundaries for asserting human control of artificial intelligence**