ISOM 1500 Insightful Decisions, Fall 2021

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 2021

L1: Thu 1:30-2:50PM Rm 5619, TA: Athena Chau, imachau@ust.hk

L2: Thu 9:00-10:20AM Online via Zoom, TA: Stacy Deng, imsdeng@ust.hk

L3: Thu 3-4:20PM Rm 5619, TA: Stacy Deng, imsdeng@ust.hk

L4: Thu 12-1:20PM Online via Zoom, TA: Stacy Deng, imsdeng@ust.hk

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 hours: Thursdays 9:30-11:30AM

TEACHING ASSISTANTS Ms. Stacy Deng (imsdeng@ust.hk), Sections L2, L3, and L4

Ms. Athena Chau (imachau@ust.hk) Section L1

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

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

Class Participation	10 (5% to top-up)
Case Assignment	10
Midterm Exam (with slides)	30
Final Exam (with slides)	40
Online and In-Class 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 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 and Readings for Each Week

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Week 1 **Sept 2** **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 **Sept 9** **Conventional Lecture** **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 **Sept 16**	**Common Elements of Effective Decision Processes** **In-Class Activities:** **1. Discuss the ProACT framework for decision-making**

½ Conventional Lecture + ½ Flipped Classroom	2. Discuss development of alternatives 3. Can good decision-making lead to negative outcomes? 4. Online survey to be completed in class.
CILO 1,2	
	Different Problem Classes; Decision Fallacies & Common Errors
Week 4	In-Class Activities:
Sept 23	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 over and over;
CILO 2,3	3. How bad decisions can be learned from peers and becomes ingrained in society. 4. Online Canvas survey to be completed in class.
Week 5	Critical Thinking Skills in System 1 and System 2
Sept 30	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 6	
Oct 7	Analytical Methods: Optimization
½ Conventional Lecture + ½ Flipped Classroom	In-Class Activities 1. Thought Experiments involving Optimization 2. Spreadsheet Modeling and Excel Solver
CILO 2,3	
Week 7	Midterm Exam

Week of Oct 21	**(Likely Thursday Oct 21st)** **No class meeting that week**
Week 8 **Oct 28** **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?**