

**THE UNIVERSITY OF HONG KONG
FACULTY OF BUSINESS AND ECONOMICS**

**MSBA7003 Quantitative Analysis Methods
2023-2024 Subclasses A and B**

GENERAL INFORMATION

Instructor: Dr. Wei ZHANG
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Office: KK 814
Consultation times: By appointment

Pre-requisites / Co-requisites: None
Mutually exclusive: N/A

Reference Books (Optional):

Quantitative Analysis for Management, 12th Edition, Global Edition by B.E. Render, M.E. Hanna, and R.M. Stair. Prentice Hall, 2012.

Bayesian Statistics for Beginners: A Step-by-Step Approach, Illustrated Edition, by Therese M. Donovan and Ruth M. Mickey. Oxford University Press, 2019.

Counterfactuals and Causal Inference: Methods and Principles for Social Research, 2nd Edition, by Stephen L. Morgan and Christopher Winship. Cambridge University Press, 2015.

The following programming languages are used in this course: R and Python.
IBM ILOG CPLEX Optimization Studio (free download [here](#)) may also be used (optional).

COURSE DESCRIPTION

Business decision making involves considerable complexity and uncertainty. To assist decision making, managers should tease out useful information from data, be able to use data to evaluate the impact of their decisions and make decisions in a scientific way. To this end, managers need to be able to build mathematical tools and models for their analysis and solve their problems with the help of computer software. This course introduces a wide array of quantitative analysis methods to help students gain a clear understanding of the decision-making process in business and management. These methods provide students with the tools and skills to approach, analyze, and solve problems of varying scales in a rigorous and also intuitive way. Furthermore, this course aims at improving a decision-maker's overall problem-solving ability by stressing approaches to 1) understand and question assumptions, 2) consider a richer set of solution alternatives, and 3) consider diverse measures of performance. The teaching methods will include lectures, discussions, in-class group games, and demonstration of several software packages.

COURSE OBJECTIVES

By introducing rigorous quantitative methods and theories, this course demonstrates ways to apply structured thinking on loosely defined business problems in reality. Upon successfully completing this course, you should be able to

1. Employ solid statistical methods for decision making,
2. Understand how to apply quantitative models and theories in business,
3. Structure and model management problems effectively, and
4. Use software tools to model and solve decision problems.

PROGRAMME LEARNING OUTCOMES

PLO1: Acquisition and internalization of knowledge of the programme discipline

PLO2: Application and integration of knowledge

PLO3: Inculcating professionalism and leadership

PLO4: Developing global outlook

PLO5: Mastering communication skills

COURSE LEARNING OUTCOMES			
Course Learning Outcomes		Aligned Programme Learning Outcomes	
CLO1: Clearly identify and define a loosely structured business problem		PLO1	
CLO2: Select and use effective techniques to address the major challenges presented		PLO2	
CLO3: Use IT tools to verify, validate, and provide solutions to the decision process		PLO2, 4	
CLO4: Communicate and support your solution with qualitative explanations		PLO3, 5	
COURSE TEACHING AND LEARNING ACTIVITIES			
Course Teaching and Learning Activities		Expected contact hour	Study Load (% of study)
T&L1. Interactive lectures		30	23%
T&L2. Online forum discussions		10	8%
T&L3. Assignments & Tutorials		50	38%
T&L4. Lecture preparation & Self-study		40	31%
Total		130	100%
Assessment Methods	Brief Description (Optional)	Weight	Aligned Course Learning Outcomes
A1. In-class & forum participation	Attendance & discussions	20%	CLO1, 2, 4
A2. Assignments	Effort and accuracy	40%	CLO1, 2, 3, 4
A3. Final exam	Effort and accuracy	40%	CLO1, 2, 4
Total		100%	
STANDARDS FOR ASSESSMENT			
Course Grade Descriptors			
A+, A, A-	<ul style="list-style-type: none">• Demonstrate a strong understanding of all relevant knowledge• Handling questions professionally• High participation in discussions• Present arguments that have an element of originality• Achieve a standard of excellent performance in the exams with very accurate computation and very good analytical and problem solving skills• Excellent performance in assignments		
B+, B, B-	<ul style="list-style-type: none">• Demonstrate a good understanding of all relevant knowledge• Handling questions in a logical way• Good participation in discussions• Present arguments that go beyond the lecture and textbook• Achieve a standard of good performance in the exams with accurate computation and good analytical and problem solving skills• Good performance in assignments		
C+, C, C-	<ul style="list-style-type: none">• Demonstrate a basic understanding of the concepts involved• Fairly address questions as set• Some participation in discussions• Present arguments in a well-structure manner• Meet a standard of acceptable performance in the exams with reasonably accurate computation and acceptable analytical and problem solving skills• Acceptable performance in assignments		

D+, D	<ul style="list-style-type: none"> • Demonstrate a minimum understanding of the concepts involved • Barely address questions as set • Minimal or no participation in discussions • Present arguments in a marginally acceptable manner • Meet a standard of marginally acceptable performance in the exams with some errors in computation and barely adequate analytical and problem solving skills • Marginally acceptable performance in assignments
F	<ul style="list-style-type: none"> • Demonstrate a poor understanding of the concepts involved • Unable or unwilling to handle questions • Minimal or no participation in discussions • Present arguments poorly • Fail to meet a standard of passing the exams with major errors in computation and inadequate analytical and problem solving skills • Poorly performance in assignments
Assessment Rubrics for Participation	
A+, A, A-	<ul style="list-style-type: none"> • High participation in discussions • Always attend in-class discussions • Demonstrate a strong understanding of all relevant knowledge • Handling questions professionally • Present arguments that have an element of originality • Respect others and follow the class rules (no chatting and do not use cell phone)
B+, B, B-	<ul style="list-style-type: none"> • Good participation in discussions • Often attend in-class discussions • Demonstrate a good understanding of all relevant knowledge • Handling questions in a logical way • Present arguments that go beyond the lecture and textbook • Respect others and follow the class rules (no chatting and do not use cell phone)
C+, C, C-	<ul style="list-style-type: none"> • Some participation in discussions • Sometimes attend in-class discussions • Demonstrate a basic understanding of the concepts involved • Fairly address questions as set • Present arguments in a well-structure manner • Respect others and follow the class rules (no chatting and do not use cell phone)
D+, D	<ul style="list-style-type: none"> • Minimal or no participation in discussions • Rarely attend in-class discussions • Demonstrate a minimum understanding of the concepts involved • Barely address questions as set • Present arguments in a marginally acceptable manner • Respect others and follow the class rules (no chatting and do not use cell phone)
F	<ul style="list-style-type: none"> • Minimal or no participation in discussions • Almost never attend in-class discussions • Demonstrate a poor understanding of the concepts involved • Unable or unwilling to handle questions • Present arguments poorly • Behave poorly in class (often chatting with others, using cell phones, or being late)
Assessment Rubrics for Assignments and the Exam	
A+, A, A-	<ul style="list-style-type: none"> • Demonstrate a strong understanding of all relevant knowledge • Present arguments that have an element of originality • Achieve a standard of excellent performance in the assessments with very accurate computation and very good analytical and problem solving skills
B+, B, B-	<ul style="list-style-type: none"> • Demonstrate a good understanding of all relevant knowledge • Present arguments that go beyond the lecture and textbook • Achieve a standard of good performance in the assessments with accurate computation and good analytical and problem solving skills
C+, C, C-	<ul style="list-style-type: none"> • Demonstrate a basic understanding of the concepts involved • Present arguments in a well-structure manner • Meet a standard of acceptable performance in the assessments with reasonably accurate computation and acceptable analytical and problem solving skills

D+, D	<ul style="list-style-type: none"> • Demonstrate a minimum understanding of the concepts involved • Present arguments in a marginally acceptable manner • Meet a standard of marginally acceptable performance in the assessments with some errors in computation and barely adequate analytical and problem solving skills
F	<ul style="list-style-type: none"> • Demonstrate a poor understanding of the concepts involved • Present arguments poorly • Fail to meet a standard of passing the assessments with major errors in computation and inadequate analytical and problem solving skills

COURSE CONTENT AND TENTATIVE TEACHING SCHEDULE

Session 1: (01/09)

- Probability & Bayesian Learning

Session 2: (05/09)

- Decision Making under Risk

Session 3: (08/09)

- Monte Carlo Simulation & Dynamic Decisions

Session 4: (12/09)

- Monte Carlo Tree Search

Session 5: (15/09)

- Linear Programming & Applications I

Session 6: (19/09)

- Linear Programming & Applications II

Session 7: (22/09)

- Mixed Integer Programming & Applications

Session 8: (26/09)

- Causal Inference I

Session 9: (03/10)

- Causal Inference II

Session 10: (06/10)

- Group Competition & Course Review

Final Exam: TBD

REQUIRED/RECOMMENDED READINGS & ONLINE MATERIALS (e.g. journals, textbooks, website addresses etc.)

To be announced on Moodle.

MEANS/PROCESSES FOR STUDENT FEEDBACK ON COURSE

☒ X conducting mid-term survey in addition to SETL around the end of the semester

☐ Online response via Moodle site

☐ Others: _____ (please specify)

COURSE POLICY (e.g. plagiarism, academic honesty, attendance, etc.)

An orderly learning environment is extremely important for this course. Disruptive behaviors are absolutely unacceptable. Academic dishonesty includes cheating, plagiarism, unauthorized collaboration, falsifying academic records, and any act designed to avoid participating honestly in the learning process. Any such dishonesty will result in an F grade.

ADDITIONAL COURSE INFORMATION (e.g. e-learning platforms & materials, penalty for late assignments, etc.)

Assignments will be submitted in class before the lectures. No late assignment will be accepted.
Lecture notes and self-learning materials will be uploaded on Moodle.
Good questions and discussions on Moodle will be awarded participation grades.