City University of Hong Kong
Course Syllabus

offered by Department of Advanced Design and Systems Engineering
with effect from Semester A 2022 / 23

Part I Course Overview

Course Title:	Managerial Decision-making Systems with Artificial Intelligence
Course Code:	ADSE6102
Course Duration:	One Semester
Credit Units:	3
Level:	P6
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	Students are expected to have either some working experience in management or taken management equivalent course(s)
Equivalent Courses: *(Course Code and Title)*	SEEM6102 Managerial Decision-making Systems with Artificial Intelligence (offered until 2021/22)
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

The aim of the course is to develop a generic understanding on the process and criteria of a manager in making a proper decision. The concept and technique of artificial intelligence (AI) will be studied on how it can aid and enhance the process in making managerial decision. By completing this course, the students should have a general understanding on AI and its usefulness in helping the managers to make appropriate decisions.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Understand the process, criteria and procedures in making managerial decisions and policies;	17%	✓		
2.	Recognize the structures, the representations of knowledge, and the algorithms of various types of existing AI-based approaches;	17%	✓		
3.	Analyze the effectiveness and limitations of AI-based approaches in managerial decision-making processes;	33%		✓	
4.	Design an AI-based decision-making system for a selected industrial case or process	33%		✓	
		100%			

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Lecture	Lectures have 24 hours. The content of lectures will roughly follow the topics covered in the Section of Keyword Syllabus with case studies for illustration purpose.	✓	✓	✓	✓	24 hours/sem
Demonstration & Discussion (small class)	Demonstration/Discussion has 9 hours distributed among a time span of 9 weeks (1 hr/week). In this activity, typical kind of system/package related to the first three CILOs will be demonstrated to students in the concerned laboratory. After the demonstrations, questions and discussion items will be given to students. Each student must participate in discussions in his group and submit a short summary for each demonstration. Comments will be received from the course examiner and colleagues. Marks will be given to each student based on his/her responses to comments, the content of the summary and the eagerness in discussion.	✓	✓	✓		9 hours/sem
Term Project Presentation (large class)	It includes the show case of samples of term project and a presentation to highlight the achievement of the term project. To accomplish these activities, the students will form groups with a size of around 3 students per group. Duration the course, a term project, which focused on CILOs 3 and 4, must be accomplished by each group. For the term project, the students are required to design an automatic managerial decision-making system using the learned AI techniques to replace the existing conventional or manual decision-making system. The AI-based system will be compared to the manual system in their efficiency and accuracy in making decisions, resource requirements and cost effectiveness. A group report to describe the structure and the expected achievements of the designed system must be submitted. A presentation will be held to report and demonstrate the student achievements in the term project so that comments can be given to further improve the designed managerial decision-making system.			✓	✓	6 hours/sem
Consultation	For students' enquiries in a personal-basis	✓	✓	✓	✓	13 hours/sem

Maximum number of students in large class is 30.

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.				Weighting	Remarks
	1	2	3	4		
Continuous Assessment: __100__ %						
Term Project and Its Report			✓	✓	50%	
Summaries and in-class Discussion	✓	✓	✓		30%	
Term Project's Presentation				✓	20%	
Examination: _0___% (duration: , if applicable)						
					100%	

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted in Semester A 2022/23 and thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Term Project and Its Report	The assessment of the term project will depend on the degree of of achievement on CILOs 3 and 4, which include the understanding of the problems, the appropriateness of suggested methods to the given problems, the suitability of the automatic managerial decision-making system for a given industrial problem.	Excellent	Good	Marginal	Failure
2. Summaries and in-class Discussion	The assessment of each submitted summary will be based on the degree of achievement on CILOs 1, 2 and 3. The portions of marks given are 1) the design and the style of submitted summary (10%), 2) the background and theory of each demonstrated AI method (20%), 3) the quality of the given comments and observations (20%) and 4) the proof on understanding the demonstrations by given the suitable answer and discussion to each designed question (50%)	Excellent	Good	Marginal	Failure
3. Term Project's Presentation	The assessment is depended on the degree of achievement on CILO 4. It includes the preparation, the style and the	Excellent	Good	Marginal	Failure

	clarity of presentation as well as the response to the comments asked during the presentation.				

The grading of achievements is on a 100% course work basis. The portion of assessment is divided as 30% for the short summaries and eagerness in participating the in-class discussion, 20% for the term project presentation, and 50% for the achievements in the term project and the quality of its report. Each term project must be accompanied by a presentation. All members of the group must responsible for the preparation of presentation. The attendance of the presentation is compulsory. Each group must submit a report for her completed term project. To facilitate individual assessment, each student in a particular group must also submit his own detailed section of contribution (called 'individual section'), which can be attached to the term project's report. In the individual section, each student must define clearly his role, the amount of work done by him, and the portion of his own contribution (in percentage) in completing the term project. The student should also include his own discussion and conclusion in the report to verify his degree on understanding the term project. Hence, the final mark given to each student may be varied due to his actual contribution and achieved efforts toward the term project.

Applicable to students admitted before Semester A 2022/23

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Term Project and Its Report	The assessment of the term project will depend on the degree of of achievement on CILOs 3 and 4, which include the understanding of the problems, the appropriateness of suggested methods to the given problems, the suitability of the automatic managerial decision-making system for a given industrial problem.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Summaries and in-class Discussion	The assessment of each submitted summary will be based on the degree of achievement on CILOs 1, 2 and 3. The portions of marks given are 1) the design and the style of submitted summary (10%), 2) the background and	High	Significant	Moderate	Basic	Not even reaching marginal levels

	theory of each demonstrated AI method (20%), 3) the quality of the given comments and observations (20%) and 4) the proof on understanding the demonstrations by given the suitable answer and discussion to each designed question (50%)					
3. Term Project's Presentation	The assessment is depended on the degree of achievement on CILO 4. It includes the preparation, the style and the clarity of presentation as well as the response to the comments asked during the presentation.	High	Significant	Moderate	Basic	Not even reaching marginal levels

The grading of achievements is on a 100% course work basis. The portion of assessment is divided as 30% for the short summaries and eagerness in participating the in-class discussion, 20% for the term project presentation, and 50% for the achievements in the term project and the quality of its report. Each term project must be accompanied by a presentation. All members of the group must responsible for the preparation of presentation. The attendance of the presentation is compulsory. Each group must submit a report for her completed term project. To facilitate individual assessment, each student in a particular group must also submit his own detailed section of contribution (called 'individual section'), which can be attached to the term project's report. In the individual section, each student must define clearly his role, the amount of work done by him, and the portion of his own contribution (in percentage) in completing the term project. The student should also include his own discussion and conclusion in the report to verify his degree on understanding the term project. Hence, the final mark given to each student may be varied due to his actual contribution and achieved efforts toward the term project.

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

- Process in making a decision.
- Human brain's structure, functions and procedures in making a decision.
- Criteria and constraints of managers in making decision.
- Definition, architecture and role of AI techniques
- Criteria of selecting proper AI techniques, their advantages and limitations.
- AI searching techniques and programming paradigms
- Comparison of conventional methods and AI in decision making systems
- Design criteria and performance evaluation methods
- Types of existing tool for developing AI-based system
- Intelligent fault feature extraction and classification system
- Intelligent prediction system for marketing and scheduling
- Intelligent management
- Design and Development of AI-based automatic decision-making systems

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

NIL

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Bojadziev G. and Bojadziev M., *Fuzzy Logic for Business, Finance and Management*, World Scientific Co. Ltd.
2.	Trippi R. and Turban E., *Neural Networks in Finance and Investment: Using Artificial Intelligence to Improve Real-World Performance*, Probos Publishing Co.
3.	Koller G., *Risk Assessment and Decision Making in Business and Industry,* CRC Press, USA.
4.	Meredith J.R. and Mantel S.J. Jr*., Project Management – A Managerial Approach,* John Wiley & Sons, Inc., 3rd Ed..
5.	Fishman M., Barr D. and Loick W., *Using Neural Networks in Market Analysis*, Technical Analysis.
6.	Skapura D., *Building Neural Networks*, Addison Wesley Co.