香港城市大學
City University of Hong Kong

City University of Hong Kong
Course Syllabus

offered by School of Data Science
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	Data Mining and Knowledge Discovery
Course Code:	SDSC8009
Course Duration:	One Semester
Credit Units:	3
Level:	R8
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	Basic Machine Learning Knowledge, Python Programming
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

Data mining focuses on algorithms and computational paradigms that allow computers to find patterns and regularities in dataset, perform predictions and generally improve the performance through interaction with data. It is currently regarded as the key element of a more general knowledge discovery process that deals with extracting useful knowledge from raw data. Students in this course will learn advanced algorithms for mining data with various forms.

The learning journey will start with the classical data mining methods for tabular and graph data and next move into vision based analytics with advanced algorithms. Students will be exposed to different model architectures and learning algorithms, such as classical and deep learning ones. The journey will go further into the various real-world applications.

2. Course Intended Learning Outcomes (CILOs)

No.	CILOs	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Describe essential data mining algorithms	15%	✓		
2.	Explain basics of problem solving via data mining	15%	✓		
3.	Implement data mining algorithms introduced in this course.	20%	✓		
4.	Apply algorithms taught in this course into emerging real-world problems.	20%	✓	✓	✓
5.	Demonstrate novel knowledge extracted from data of considered real problems through utilizing algorithms taught in this course	30%	✓	✓	✓
		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. Learning and Teaching Activities (LTAs)

LTA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Lecture	- large class activity - questions and discussion	✓	✓	✓	✓	✓	39 hours/sem

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.					Weighting*	Remarks
	1	2	3	4	5		
Continuous Assessment: 100 %							
Group Project Students will conduct a collaborative research project based on taught concepts.	✓	✓	✓	✓	✓	40%	
Individual Assignment Students will utilize designed assignments to test their gained understanding of a sub-set of taught concepts and their implementation.	✓	✓	✓	✓		30%	
Take-home Test An open book and notes examination aiming at assessing the understanding of the overall materials and some open questions for demonstrating the capability of the further exploration.		✓	✓	✓	✓	30%	
Examination: 0 % (duration: , if applicable)							
						100%	

5. Assessment 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. Group Project	Application of class materials and teamwork	High	Significant	Basic	Not even reaching marginal levels
2. Individual Assignment	Application of class materials	High	Significant	Basic	Not even reaching marginal levels
3. Take-home Test	Understanding of class materials	High	Significant	Basic	Not even reaching marginal levels

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. Group Project	Application of class materials and teamwork	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Individual Assignment	Application of class materials	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Take-home Test	Understanding of class materials	High	Significant	Moderate	Basic	Not even reaching marginal levels

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

1. Keyword Syllabus

- Data Mining Essentials
- Dimensionality Reduction and Visualization
- Clustering and Classification
- Introduction to Neural Networks
- Network Embedding
- Deep Neural Networks
- Selected Data Mining Applications

2. Reading List

2.1 Compulsory Readings

1.	Pang-Ning Tan, Michael Steinbach, and Vipin Kumar. Introduction to Data Mining (2nd Edition), Pearson, 2018.
2.	Lecture notes
3.	Journal articles and conference papers selected by the instructor

2.2 Additional Readings

NIL