

**City University of Hong Kong
Course Syllabus**

**offered by School of Data Science
with effect from Semester B 2022/23**

Part I Course Overview

Course Title:	Machine Learning
Course Code:	SDSC8003
Course Duration:	One Semester
Credit Units:	3
Level:	R8
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: <i>(Course Code and Title)</i>	Nil
Precursors: <i>(Course Code and Title)</i>	Nil
Equivalent Courses: <i>(Course Code and Title)</i>	Nil
Exclusive Courses: <i>(Course Code and Title)</i>	Nil

Part II Course Details

1. Abstract

This course focuses on machine learning models and their deployments. Topics include neural networks, convolutional neural networks, self-attention, transformers, clustering, dimensionality reduction, autoencoder, generative adversarial networks, self-supervision, adaptation, on-device machine learning, and federated learning.

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 fundamental principles, ideas, and theories of machine learning and deep learning	20%	✓		
2.	Familiarize machine learning and deep learning methods and their computational algorithms	20%	✓		
3.	Apply existing machine learning methods and design new algorithms to practical datasets	30%	✓	✓	✓
4.	Understand principles and research on practices to deploy machine learning models to systems	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. Teaching and Learning Activities (TLAs)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Lecture	Learning through teaching is primarily based on lectures and demonstrations.	✓	✓	✓	✓			39 hours in total

4. Assessment Tasks/Activities (ATs)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4				
Continuous Assessment: <u>70</u> %								
<u>Programming Test</u> Open-book Python programming test to assess students' ability to apply machine learning methods on given datasets	✓	✓	✓				35%	
<u>Research Presentation</u> Group research to demonstrate the students' understanding and research on machine learning models and systems	✓	✓		✓			35%	
Examination: <u>30</u> % (duration: 2 hours, if applicable)								
<u>Examination</u> Questions are designed to see how well the students have learned the basic concepts, fundamental theory, and applications of learning algorithms.	✓	✓	✓	✓			30%	
							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. Programming Test	Ability to learn the basic concepts, apply methods and algorithms of machine learning.	High	Moderate	Basic	Not even reaching marginal level
2. Research Presentation	Ability to conduct and demonstrate research on machine learning models and systems.	High	Moderate	Basic	Not even reaching marginal level
3. Examination	Ability to solve learning tasks using machine learning methods.	High	Moderate	Basic	Not even reaching marginal level

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. Programming Test	Ability to learn the basic concepts, apply methods and algorithms of machine learning.	High	Significant	Moderate	Basic	Not even reaching marginal level
2. Research Presentation	Ability to conduct and demonstrate research on machine learning models and systems.	High	Significant	Moderate	Basic	Not even reaching marginal level
3. Examination	Ability to solve learning tasks using machine learning methods.	High	Significant	Moderate	Basic	Not even reaching marginal level

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

1. Keyword Syllabus

Neural networks, convolutional neural networks, self-attention, transformers, clustering, PCA, autoencoder, generative adversarial networks, self-supervision, adaptation, model compression, and federated learning.

2. Reading List

2.1 Compulsory Readings

1.	Lecture slides
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2.2 Additional Readings

1.	I. Goodfellow, Y. Bengio, and A. Courville, Deep Learning, MIT Press, 2016.
2.	The Elements of Statistical Learning, by Hastie, Tibshirani, Friedman, Springer 2001