City University of Hong Kong
Course Syllabus

offered by Department of Computer Science
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	Intelligent Systems
Course Code:	CS5486
Course Duration:	One semester
Credit Units:	3 credits
Level:	P5
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	Nil
Precursors: *(Course Code and Title)*	CS2468 Data Structures and Data Management or CS3334 Data Structures or equivalent
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

This course aims to equip students with the skills of problem solving using artificial intelligence (AI) techniques through a demonstrable knowledge in a range of problem solving methods and the associated knowledge representation and machine learning techniques.

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.	Demonstrate knowledge of the fundamental principles of intelligent systems.		✓	✓	
2.	Distinguish between conventional computer applications and intelligent applications.		✓	✓	
3.	Critique and compare the relative merits of a variety of AI problem solving techniques.		✓	✓	
4.	Formulate and analyse intelligent system problems.		✓	✓	✓
5.	Create design and implement intelligent problem solving methods.			✓	✓
		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 real-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)

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

LTA	Brief Description	CILO No.					Hours/week (if applicable)
		1	2	3	4	5	
Lectures and tutorials	The course will consist of a balance-mixed of theory and practice. Through a combination of formal lectures and coursework, the students will become able to apply major AI concepts and problem solving approaches to problem-solving. The coursework will consist of special topics in which the student conducts a case study of a recently proposed AI approach, the findings of which are to be described in a presentation, and a project that involves applying suitable AI algorithms to solve a practical problem.	✓	✓	✓	✓	✓	3 hrs/week

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	5		
Continuous Assessment: 50%							
Mini-projects	✓	✓	✓	✓	✓	20%	
Mid-term examination	✓	✓	✓	✓		30%	
Final Examination^: 50% (duration: 2 hours)	✓	✓	✓	✓		50%	
						100%	

^ For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

5. Assessment Rubrics

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

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
Mini-projects	Ability to implement some existing AI techniques for problem solving	Outstanding	Significant	Moderate	Basic	Below marginal levels
Mid-term examination	Ability to understand and use taught AI techniques for problem solving	Outstanding	Significant	Moderate	Basic	Below marginal levels
Final Examination	Ability to understand, explain, and apply taught AI techniques for problem solving	Outstanding	Significant	Moderate	Basic	Below marginal levels

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
Mini-projects	Ability to implement some existing AI techniques for problem solving	Outstanding	Significant	Moderate to basic	Below marginal levels
Mid-term examination	Ability to understand and use taught AI techniques for problem solving	Outstanding	Significant	Moderate to basic	Below marginal levels
Final Examination	Ability to understand, explain, and apply taught AI techniques for problem solving	Outstanding	Significant	Moderate to basic	Below marginal levels

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.)

Artificial intelligence vs. computational intelligence. Neural networks. Knowledge representations. Machine learning. Rule-based systems. Fuzzy Systems. Evolutionary computation.

Syllabus

1. Overview

   An introduction to the goals and objectives of AI as a discipline and its milestones. Approaches in AI. Major components in intelligent systems.

2. Knowledge acquisition/representation and machine learning

   Methods of knowledge acquisition and representations. Associative memory. Techniques on machine learning such as supervised learning, unsupervised learning, reinforcement learning, and deep learning. Generalization.

3. Nature-inspired optimization methods

   Basic concepts of graph and tree search. Optimization methods such as stochastic annealing, neurodynamic optimization, genetic algorithm, particle swarm optimization, ant colony optimization, and differential evolution.

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.)

	NA

2.2 Additional Readings

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

1.	R. Rojas, *Neural Networks: A Systematic Introduction*, Springer, 1996.
2.	S. Haykin, *Neural Networks and Learning Machines* (3rd Ed), Prentice-Hall, 2009.
3.	S. Russell and P. Norvig *Artificial Intelligence: A Modern Approach*. 3rd Ed. Prentice-Hall (2009)