City University of Hong Kong
Course Syllabus

offered by College/School/Department of Electrical Engineering
with effect from Semester B, 2019/2020

Part I   Course Overview

Course Title:	Engineering Applications of Artificial Intelligence
Course Code:	EE4016
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	B4
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	MA2001 Multi-variable Calculus and Linear Algebra
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II   Course Details

1.   Abstract
(A 150-word description about the course)

This course will introduce the basics of Artificial Intelligence (AI) and some of the representative applications in engineering. In this course, students will learn the essential foundations of AI, from algorithms to programming tools. Students will gain a solid foundation in AI by building AI systems with modern platforms such as python and its associated AI libraries.

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.	Able to describe various artificial intelligence techniques and their features		√		
2.	Able to apply suitable techniques to solve engineering problems			√	
3.	Able to implement techniques with suitable platform			√	

* If weighting is assigned to CILOs, they should add up to 100%.   100%

[#] *Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.*

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				
Lecture	Key concepts are described and illustrated	√	√	√				2 hrs/wk
Tutorial	Key concepts are illustrated and worked out based on problems	√	√	√				1 hr/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: <u>50%</u>								
Tests (min.: 2)	✓	✓	✓	✓	✓		30%	
#Assignments (min.: 3)	✓	✓	✓	✓	✓		20%	
Examination: <u>50%</u> (duration: 2hrs , if applicable)								
Examination	✓	✓	✓	✓	✓		50%	

* The weightings should add up to 100%.	100%

Remark:
To pass the course, students are required to achieve at least 30% in course work and 30% in the examination.
may include homework, tutorial exercise, project/mini-project, presentation

5. **Assessment Rubrics**

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

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Coursework	Achievements in CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

6. **Constructive Alignment with Major Outcomes**

MILO	How the course contribute to the specific MILO(s)
1	An ability to apply knowledge of mathematics, science and data engineering
3	An ability to analyze a system, or process that conforms to a given specification within realistic constraints
5	An ability to identify, evaluate, formulate and solve engineering and IT problems

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.)

   Introduction to AI techniques including constraint satisfaction problems, regression problems, pattern recognition, logic programming, natural language processing, machine learning and neural networks.

   Applications of AI methods in engineering: data analytics and engineering, AI-driven software-defined networking, decision-support systems, logistic planning and scheduling, real-time intelligent automation, optimization methods for non-differentiable functions, and sparse approximation.

   Case studies in engineering applications such as chatbot, face recognition for security, and recommendation 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.)

| 1. | Python Programming for the Absolute Beginner, 3rd Edition |
| 2. | Artificial Intelligence with Python: A Comprehensive Guide to Building Intelligent Apps for Python Beginners and Developers 1st Edition,   Kindle Edition by Prateek Joshi |

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

| 1. | Pedregosa, Fabian, et al. "Scikit-learn: Machine learning in Python." *Journal of machine learning research* 12.Oct (2011): 2825-2830. |