Form 2B

City University of Hong Kong

Information on a Course
offered by Department of Computer Science
with effect from Semester A in 2012 / 2013

Part I

Course Title: Intelligent Systems

Course Code: CS5486

Course Duration: One Semester

Credit Units: 3

Level: P5

Medium of Instruction: English

Prerequisites: Nil

Precursors: CS2302 Data Structures and Algorithms or
CS2468 Data Structures and Data Management or
CS3334 Data Structures or
Any equivalent course at undergraduate level

Equivalent Courses: Nil

Exclusive Courses: Nil

Part II

Course Aims

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

Course Intended Learning Outcomes (CILOs)

Upon successful completion of this course, students should be able to:

No.	CILOs	Weighting (if applicable)
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.	

Teaching and Learning Activities (TLAs)

(Indicative of likely activities and tasks designed to facilitate students' achievement of the CILOs. Final details will be provided to students in their first week of attendance in this course)

Teaching pattern:

Suggested lecture/tutorial/laboratory mix: 2 hrs. lecture; 1 hr. tutorial.

CILO No.	TLAs	Hours/week (if applicable)
CILO 1 - CILO 5	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 solving real life problems. The coursework will consist of a special topic study in which the student performs a critical analysis 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 real world problem.	

Assessment Tasks/Activities

(Indicative of likely activities and tasks designed to assess how well the students achieve the CILOs. Final details will be provided to students in their first week of attendance in this course)

The course ILOs are assessed using the following approaches:

CILO No.	Type of Assessment Tasks/Activities	Weighting (if applicable)	Remarks
CILO 1, CILO 2	ILO 1 and 2 will be assessed mainly through examination that aims to assess the depth of understanding on a range of AI concepts and techniques.		
CILO 4, CILO 5	ILO 4 and 5 will be assessed through coursework for which the students have to demonstrate practical design as well as analytical skills to select, implement and evaluate the effectiveness and efficiency of the chosen intelligent techniques and approaches to solving a specific problem.		
CILO 3	ILO 3 will be assessed through a combination of examination and coursework.		

Grading of Student Achievement: Refer to Grading of Courses in the Academic Regulations for Taught Postgraduate Degrees.

Examination duration: 2 hours

Percentage of coursework, examination, etc.: 30% CW; 70% Exam

Grading pattern: Standard (A+AA-…F)

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

Part III

Keyword Syllabus

Artificial intelligence. State space search. Heuristic search, Knowledge representations. Rule-based systems, Stocastic search algorithms, Logical inference, Uncertainy reasoning methods, Machine Learning, Decision trees.

Syllabus

1. Overview

   An introduction to the goals and objectives of AI as a discipline and its relationship with other disciplines. Approaches in AI. Major components in a typical intelligent system.

2. Search Methods

   Basic concepts of graph and tree search. Three simple search methods: breadth-first search, depth-first search, iterative deepening search. Heuristic search methods: best-first search, admissible evaluation functions, hill-climbing search. Optimisation and search such as stochastic annealing and genetic algorithm.

3. Knowledge representation and logical inference

   Issues in knowledge representation. Structured representation, such as frames, and scripts, semantic networks and conceptual graphs. Formal logic and logical inference. Knowledge-based systems structures, its basic components. Ideas of Blackboard architectures.

4. Reasoning under uncertainty and Learning

   Techniques on uncertainty reasoning such as Bayesian reasoning, Certainty factors and Dempster-Shafer Theory of Evidential reasoning. A study of different learning and evolutionary algorithms, such as statistical learning and induction learning.

Recommended Reading
Text(s)

Essential Text

Luger G.F. and Stubblefield W.A. Artificial Intelligence: Structures and strategies for Complex Problem Solving. Addison Wesley (2009)

Supplementary Reading

O'Leary D. (Editor-in-Chief) IEEE Intelligent Systems & their Applications. Different issues

Bundy A. (Ed.) *Artifical Intelligence Techniques: A Comprehensive Catalogue*. *4th Ed. Springer-Verlag (1996)*

Dean A., Allen J. and Aloimonos Y. *Artificial Intelligence: Theory and Practice*. *Addison Wesley (1995)*

Russell S. and Norvig P. *Artificial Intelligence: A Modern Approach*. *3rd Ed. Prentice-Hall (2009)*

Winston P.H. *Artificial Intelligence*. *3rd Ed. Addison Wesley (1993)*

Online Resources