Subject Description Form

Subject Code	COMP4431
Subject Title	Artificial Intelligence
Credit Value	3
Level	4
Pre-requisite / Co-requisite / Exclusion	**Pre-requisite**: COMP2011
Objectives	The objectives of this subject are to: • introduce the fundamental concepts of artificial intelligence; • equip students with the knowledge and skills in programming of artificial intelligence techniques; • master the problem formulation and the typical intelligent algorithms • understand the technical development of artificial intelligence • aware the ethical issues related to artificial intelligence.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: *Professional/academic knowledge and skills* (a) understand the history, development, and technical trend of artificial intelligence; (b) understand the important concepts in artificial intelligence and the problem addressed by intelligent techniques; (c) familiarize with typical programming language and tool to implement artificial intelligence techniques; (d) master the characters of intelligent agent, knowledge based agent, problem solving agents, multiagent, and the typical examples. (e) learn the design rationale and the typical algorithms of problem-solving agents, in particular, search algorithms and their applications in real world; (f) master the skills and techniques in machine learning, such as decision tree induction, support vector machine, and artificial neural networks; (g) understand the ethical issues related to artificial intelligence. *Attributes for all-roundedness* (h) explore the nature of human intelligence and its role in problem solving;

	(i) deepen thoughts and understanding of human abilities such as learning, reasoning and planning; and
	(j) appreciate the rooted philosophical arguments in artificial intelligence and its impact on human thoughts.
Subject Synopsis/ Indicative Syllabus	**Topic**
	1. Introduction to Artificial Intelligence Definition of artificial intelligence; basic concepts of human intelligence; scope of classical artificial intelligence problem; the birth, golden time, and the winter of artificial intelligence.
	2. Agent and Knowledge Base Definition of agents and rationality; design an intelligent agent; knowledge-based agents and knowledge representation language; inference using forward chain and backward chain; uncertainty and Bayesian networks.
	3. Problem-solving Agents Problem-solving agents; uninformed search strategies and typical algorithms; informed search strategies and typical algorithms; heuristic functions; hill-climbing search, simulated annealing search, genetic algorithms; constraint satisfaction problem and game problem.
	4. Machine Learning Supervised learning, unsupervised learning, and reinforcement learning; classification, clustering, and regression; decision tree; support vector machine, artificial neural networks.
	5. Applications and Ethical Issues Latest development of artificial intelligence; typical applications; ethical issues of artificial intelligence techniques and applications; benefits and risk to human society.
Teaching/ Learning Methodology	During the lecture, students will come across the concepts, algorithms and applications in artificial intelligence, and will be supplemented by exercises, labs, and project.

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)									
		a	b	c	d	e	f	g	h	i	j
1. Continuous Assessment	**55%**	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Final Examination	**45%**	✓	✓	✓	✓	✓	✓	✓			
Total	100 %										

Assessment Methods in Alignment with Intended Learning Outcomes

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Continuous assessments consist of a project, lab exercises, and quizzes, which are designed to facilitate students to achieve intended learning outcomes. Lab exercise is designed to encourage students to acquire good understanding of the relevant knowledge, practice in order to enrich their hands-on experience with various software tools. The project is designed to enhance students' ability to acquire the understanding and using different knowledge, principles, techniques, tools to solve a real problem through team. Quizzes are to ensure the students understand the concepts.

Student Study Effort Expected

Class contact:

▪ Class activities including lecturers, tutorial, and labs	39 Hrs.

Other student study effort:

▪ Coursework and Project	80 Hrs.
Total student study effort	119 Hrs.

Reading List and References

Textbooks:

1. Russell, Stuart and Norvig, Peter, *Artificial Intelligence: A Modern Approach*, 3rd Edition, Pearson, 2009.

Reference Books:

1. Pal, Sankar K. and Shiu, Simon C. K., *Foundations of Soft Case-Based Reasoning*, John Wiley, 2004.

2. Negnevitsky, Michael, *Artificial Intelligence: A Guide to Intelligent Systems,* 2nd Edition, Addison Wesley, 2005.