

Subject Description Form

Subject Code	COMP4431
Subject Title	Artificial Intelligence
Credit Value	3
Level	4
Pre-requisite / Co-requisite / Exclusion	Pre-requisite: COMP2011/COMP2013/DSAI2201
Objectives	<p>The objectives of this subject are to:</p> <ol style="list-style-type: none">1. introduce the fundamental concepts of artificial intelligence;2. equip students with the knowledge and skills in the programming of artificial intelligence techniques;3. master the problem formulation and the typical intelligent algorithms;4. understand the technical development of artificial intelligence; and5. make students become aware of the ethical issues related to artificial intelligence.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <p><u>Professional/academic knowledge and skills</u></p> <ol style="list-style-type: none">(a) understand the history, development, and technical trend of artificial intelligence;(b) understand the important concepts in artificial intelligence and the problems addressed by intelligent techniques;(c) master programming languages and tools to implement artificial intelligence techniques;(d) able to apply the skills and techniques in machine learning, such as decision tree induction, support vector machine, and artificial neural networks;(e) learn the design rationale and the typical algorithms of problem-solving agents, in particular, search algorithms and their applications in real world;(f) deal with the ethical issues related to artificial intelligence;

	<p><u>Attributes for all-roundedness</u></p> <p>(g) explore the nature of human intelligence and its role in problem-solving; and</p> <p>(h) deepen thoughts and understanding of human abilities such as learning, reasoning and planning</p>						
<p>Subject Synopsis/ Indicative Syllabus</p>	<table border="1"> <tr> <td data-bbox="521 394 1386 464"> <p>Topic</p> </td> </tr> <tr> <td data-bbox="521 464 1386 659"> <p>1. Introduction to Artificial Intelligence</p> <p>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.</p> </td> </tr> <tr> <td data-bbox="521 659 1386 890"> <p>2. Agent and Knowledge Base</p> <p>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.</p> </td> </tr> <tr> <td data-bbox="521 890 1386 1157"> <p>3. Problem-solving Agents</p> <p>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.</p> </td> </tr> <tr> <td data-bbox="521 1157 1386 1352"> <p>4. Machine Learning</p> <p>Supervised learning, unsupervised learning, and reinforcement learning; classification, clustering, and regression; decision tree; support vector machine, artificial neural networks.</p> </td> </tr> <tr> <td data-bbox="521 1352 1386 1547"> <p>5. Applications and Ethical Issues</p> <p>Latest development of artificial intelligence; typical applications; ethical issues of artificial intelligence techniques and applications; benefits and risk to human society.</p> </td> </tr> </table>	<p>Topic</p>	<p>1. Introduction to Artificial Intelligence</p> <p>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.</p>	<p>2. Agent and Knowledge Base</p> <p>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.</p>	<p>3. Problem-solving Agents</p> <p>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.</p>	<p>4. Machine Learning</p> <p>Supervised learning, unsupervised learning, and reinforcement learning; classification, clustering, and regression; decision tree; support vector machine, artificial neural networks.</p>	<p>5. Applications and Ethical Issues</p> <p>Latest development of artificial intelligence; typical applications; ethical issues of artificial intelligence techniques and applications; benefits and risk to human society.</p>
<p>Topic</p>							
<p>1. Introduction to Artificial Intelligence</p> <p>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.</p>							
<p>2. Agent and Knowledge Base</p> <p>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.</p>							
<p>3. Problem-solving Agents</p> <p>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.</p>							
<p>4. Machine Learning</p> <p>Supervised learning, unsupervised learning, and reinforcement learning; classification, clustering, and regression; decision tree; support vector machine, artificial neural networks.</p>							
<p>5. Applications and Ethical Issues</p> <p>Latest development of artificial intelligence; typical applications; ethical issues of artificial intelligence techniques and applications; benefits and risk to human society.</p>							
<p>Teaching/ Learning Methodology</p>	<p>During the lecture, students will come across the concepts, algorithms and applications in artificial intelligence, and will be supplemented by exercises, labs, and project.</p>						

Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed							
			a	b	c	d	e	f	g	h
	1. Continuous Assessment	30%	✓	✓	✓	✓	✓	✓	✓	✓
	2. Final Examination	70%	✓	✓	✓	✓	✓	✓		
	Total	100 %								
	<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>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 of and using different knowledge, principles, techniques, tools to solve a real problem through teamwork. Quizzes are to ensure the students understand the concepts.</p>									
Student Study Effort Expected	Class contact:									
	<ul style="list-style-type: none"> Class activities including lecturers, tutorial, and labs 							39 Hrs.		
	Other student study effort:									
	<ul style="list-style-type: none"> Coursework and Project 							80 Hrs.		
	Total student study effort							119 Hrs.		
Reading List and References	Textbooks:									
	1. Russell, Stuart and Norvig, Peter, <i>Artificial Intelligence: A Modern Approach</i> , 3 rd Edition, Pearson, 2009.									
	Reference Books:									
	1. Pal, Sankar K. and Shiu, Simon C. K., <i>Foundations of Soft Case-Based Reasoning</i> , John Wiley, 2004.									
	2. Negnevitsky, Michael, <i>Artificial Intelligence: A Guide to Intelligent Systems</i> , 2 nd Edition, Addison Wesley, 2005.									