

Subject Description Form

Subject Code	EIE1004
Subject Title	Introduction to Information and Artificial Intelligence Engineering
Credit Value	3
Level	1
Pre-requisite/ Co-requisite/ Exclusion	Curiosity for new technologies An open mind to accepting and using new technologies
Objectives	This subject introduces the technology trends in artificial intelligence (AI) and information engineering (IE) to first-year students. The subject is an exploration of the technologies that will shape organizations and industry in the coming decade. It also aims to strengthen the awareness of the importance of EIE-related technologies and how these technologies affect the local and global economy and students' future careers. After taking this subject, students will gain insights into the new technologies and how organizations could cope with the disruption caused by these technologies. Students will also understand what IE and AI are about and their relationship with other disciplinary-specific subjects in the academic programmes.
Intended Subject Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <p><u>Category A: Professional/academic knowledge and skills</u></p> <ol style="list-style-type: none"> 1. Aware the technological trends in information engineering (IE[#]) and artificial intelligence (AI). 2. Understand what AI and IE are about 3. Understand how AI and IE will affect the global economy and the job market in the future <p><u>Category B: Attributes for all-roundedness</u></p> <ol style="list-style-type: none"> 4. Recognize the need for and engage in life-long learning <p>[#]IE includes electronic systems, Internet-of-things, and information security</p>
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none"> 1. Lifelong Learning <ol style="list-style-type: none"> 1.1. Exploring emerging technologies for lifelong learning 1.2. Habits of successful lifelong learners 2. Artificial Intelligence <ol style="list-style-type: none"> 2.1. Introduction to artificial intelligence and machine learning 2.2. Why historical AI fails and modern AI successes 2.3. Example applications of AI: face recognition; speech recognition; natural language processing; biometrics; voice cloning; emotion recognition; machine translation; autonomous driving; imaging diagnosis; AI composers; AI reporters; creative art; music generation; bioinformatics and drug development 2.4. Non-mathematical view of learning (model training) and inferencing 2.5. Role of data and the cloud in AI 2.6. Limitation of current AI and machine learning 2.7. Workflow of an AI project 2.8. AI in society: discrimination, bias, adversarial attacks, adverse use of AI, deepfake, spoofing; jobs affected by AI, and new job opportunities 2.9. Trends in AI and machine learning: artificial general intelligence; self-learning 3. Cybersecurity and Information Security <ol style="list-style-type: none"> 3.1. Fundamental of cyberthreat: malware, ransomware, phishing, DDoS attacks, etc. 3.2. Fundamental of blockchain

	<p>3.3. Applications of blockchain: bitcoins, contract, securing data, payment</p> <p>3.4. Threat to the society and economy</p> <p>3.5. Trends in cybersecurity: IoT security; AI for cyber-attack; AI in fintech</p> <p>4. Information Engineering</p> <p>4.1. Cloud and edge computing</p> <p>4.2. Data organization and representation</p> <p>4.3. Data science and big-data analytics</p> <p>4.4. Internet of Things</p> <p>4.5. Virtual reality and augmented reality</p> <p>4.6. 5G and beyond</p> <p>5. Electronic Systems</p> <p>5.1. Role of electronic engineering in environmental sustainability</p> <p>5.2. Wireless power transfer</p> <p>5.3. Wireless wearable technology</p> <p>5.4. Smart household appliances</p> <p>5.5. Smart city</p> <p>5.6. Brain machine interface</p> <p>5.7. Trends in electronic systems</p>
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Teaching/Learning Methodology	<p>Lectures: The subject matters will be delivered through lectures. Students will be engaged in the lectures through Q&A, discussions, and specially designed classroom activities.</p> <p>Tutorials: During tutorials, students will work on/discuss some chosen topics. This will help strengthen the knowledge taught in lectures.</p> <p>Literature survey, essay writing, and presentation: Students are required to pick a topic, study the background information of the selected topic, search for the latest development and application of the topic from the Internet, and write an essay about the selected topic. Students also need to present their essay either through video recordings or in front of their fellow classmates.</p> <p>While lectures and tutorials will help to achieve the professional outcomes, the literature surveys and essay writing will strengthen students' awareness of new technologies and their impact on society.</p> <p>Mini project: Students will use toolkits to develop AI applications such as recognizing hand signs (scissors, paper, and stone) and voice-control robot cars.</p>
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Assessment Methods in Alignment with Intended Subject Learning Outcomes	<table border="1"> <thead> <tr> <th rowspan="2">Specific Assessment Methods/Tasks</th> <th rowspan="2">% Weighting</th> <th colspan="4">Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)</th> </tr> <tr> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>1. Continuous Assessment</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>• Literature surveys, essay writing, and presentation</td> <td>40%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>• Mini Project</td> <td>30%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> </tr> <tr> <td>• Test and quizzes</td> <td>30%</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> </tr> <tr> <td>Total</td> <td>100%</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Specific Assessment Methods/Tasks	% Weighting	Intended Subject Learning Outcomes to be Assessed (Please tick as appropriate)				1	2	3	4	1. Continuous Assessment						• Literature surveys, essay writing, and presentation	40%	✓	✓	✓	✓	• Mini Project	30%	✓	✓	✓	✓	• Test and quizzes	30%	✓	✓	✓		Total	100%				
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<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>The tests will ensure that students know the fundamental knowledge of EIE-related technologies and the relationship between these technologies and society.</p> <p>The mini project will ensure that students have the ability to use existing toolkit</p>																																									

	to develop AI applications.	
	The literature surveys, essay writing, and presentation will ensure that students understand the importance of life-long learning.	
Student Study Effort Expected	Class contact (time-tabled):	
	• Lectures	24 Hours
	• Tutorial/Laboratory/Practice Classes	15 Hours
	Other student study effort:	
	• Lecture: preview/review of notes; homework/assignment; preparation for test/quizzes	36 Hours
	• Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing	30 Hours
	Total student study effort:	105 Hours
Reading List and References	Reference Materials: <ol style="list-style-type: none"> 1. Selected articles from recent issues of IEEE Spectrum 2. Selected articles from recent issues of IEEE Potential 3. Selected video from ColdFusion and Future Now 4. The World in 2050: Future Technology (https://www.youtube.com/watch?v=PIsJpRce18s) 	
Last Updated	June 2021	
Prepared by	Prof. M.W. Mak	