

Subject Description Form

Subject Code	EIE1D03 (CAR STE Subject)
Subject Title	Artificial Intelligence and Science Fiction
Credit Value	3
Level	1
Pre-requisite / Co-requisite/ Exclusion	Nil
Objectives	<ol style="list-style-type: none"> 1. To inspire student interest in artificial intelligence (AI) by exploring applications of AI and its impact to human beings' life. 2. To stimulate students' critical thinking and imagination through the study of AI.
Intended 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. Understand the benefits and limitations of current AI techniques, its culture and society impacts, philosophical issues, and possible future development. 2. Appreciate basic AI problems and approaches. 3. Appreciate the basic design concepts of AI games and typical AI systems. 4. Explore the applications of AI techniques and humanoid robotics in everyday life, entertainment, industry, and business. <p><u>Category B: Attributes for all-roundedness</u></p> <ol style="list-style-type: none"> 5. Think critically and creatively. 6. Recognize social responsibility and ethics.
Subject Synopsis/ Indicative Syllabus	<ol style="list-style-type: none"> 1. <u>Introduction</u> Definitions of AI, Brief History of AI, State of the Art 2. <u>Philosophical Issues of AI</u> Human Intelligence, Turing Test, Simulation of Brain, Consciousness, Minds, Free Will, Machine Emotion, Digital Soul, Machine Ethics 3. <u>Introduction to AI Approaches</u> Knowledge Representation, Problem Solving Paradigms, Machine Learning, Expert Systems and Fuzzy Systems, Artificial Neural Networks, Deep Learning, Evolutionary Computation 4. <u>AI Games</u> Search Methods, Minimax Search, Deep Blue (Chess Computer) and AlphaGo, State-of-the-Art Game Programs, AI in games 5. <u>AI Applications</u> Natural Language Processing, Machine Translation, AI in Finance and Investment, AI in Medicine 6. <u>Robots and Robotics</u> Three Laws of Robotics, Embodiment, Humanoid Robotics, Entertainment Robots, Industrial Applications, Robotic Technology in Everyday Life 7. <u>Artificial Intelligence in Science Fiction</u> "I, Robot" (2004), "The Terminator" (1984, 1991, 2003, 2009), and "Robocop" (1987, 1990, 1993): Cyborg, Hybrid of Man and Machine, Morality, Free Will, Empathy, Moral and Ethical Issues "2001: A Space Odyssey" (1968): HAL 9000, Speech Recognition, Natural Language Processing, Facial Expression Recognition, Art Appreciation, Reasoning, Emotional Behaviors "A.I. Artificial Intelligence" (2001): Humanoids, Thoughts and Emotions

	<p>8. <u>Future Directions of AI</u> Embodied Cognition, Automatic Language Acquisition, Hybrid Systems, Bio-robotics, Nanorobotics, Artificial Life, Evolutionary Robotics</p> <p>9. <u>Culture and Society Impacts</u> Culture and Society Impacts of AI, Ethics and Risks of Developing AI Solutions</p>																																																											
<p>Teaching/Learning Methodology</p>	<table border="1"> <thead> <tr> <th data-bbox="475 398 703 555">Teaching and Learning Method</th> <th data-bbox="703 398 890 555">Intended Subject Learning Outcome</th> <th data-bbox="890 398 1401 555">Remarks</th> </tr> </thead> <tbody> <tr> <td data-bbox="475 555 703 689">Lecture</td> <td data-bbox="703 555 890 689">1, 2, 3, 4, 6</td> <td data-bbox="890 555 1401 689">fundamental principles and key concepts of the subject are delivered to students; guidance on further readings is given.</td> </tr> <tr> <td data-bbox="475 689 703 920">Tutorials/ Demos</td> <td data-bbox="703 689 890 920">1, 2, 3, 4, 5</td> <td data-bbox="890 689 1401 920">supplementary to lectures and are conducted with a smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; problems and application examples are given and discussed.</td> </tr> <tr> <td data-bbox="475 920 703 1093">Science Fiction Films Viewing</td> <td data-bbox="703 920 890 1093">2, 4,6</td> <td data-bbox="890 920 1401 1093">Supplementary to lectures; students are asked to identify the AI technologies portrayed and to think critically about the important issues raised in the sci-fi movies.</td> </tr> <tr> <td data-bbox="475 1093 703 1518">Assignments</td> <td data-bbox="703 1093 890 1518">1, 2, 3, 4, 5, 6</td> <td data-bbox="890 1093 1401 1518">Assignment 1 will ask each student to carefully read one or more sci-fi books, or watch one or more sci-fi movies chosen by the student and write up a book or movie report to discuss the AI techniques/applications portrayed and the important issues raised in the book(s)/movie(s). Assignment 2 will ask each student to conduct individual survey/research on the applications of AI technologies in a field chosen by the student and write up a survey/review report.</td> </tr> </tbody> </table>						Teaching and Learning Method	Intended Subject Learning Outcome	Remarks	Lecture	1, 2, 3, 4, 6	fundamental principles and key concepts of the subject are delivered to students; guidance on further readings is given.	Tutorials/ Demos	1, 2, 3, 4, 5	supplementary to lectures and are conducted with a smaller class size; students will be able to clarify concepts and to have a deeper understanding of the lecture material; problems and application examples are given and discussed.	Science Fiction Films Viewing	2, 4,6	Supplementary to lectures; students are asked to identify the AI technologies portrayed and to think critically about the important issues raised in the sci-fi movies.	Assignments	1, 2, 3, 4, 5, 6	Assignment 1 will ask each student to carefully read one or more sci-fi books, or watch one or more sci-fi movies chosen by the student and write up a book or movie report to discuss the AI techniques/applications portrayed and the important issues raised in the book(s)/movie(s). Assignment 2 will ask each student to conduct individual survey/research on the applications of AI technologies in a field chosen by the student and write up a survey/review report.																																							
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Student Study Effort Expected	Class contact (time-tabled):									
	• Lecture	26 Hours								
	• Tutorials/Seminars/Demos	13 Hours								
	• Other student study effort:									
	• Self-learning (review of materials, intensive reading of science fiction books, watching science fiction movies, preparation for test)	35 Hours								
	• Assignments	32 Hours								
	Total student study effort:	106 Hours								
Reading List and References	<p>References:</p> <ol style="list-style-type: none"> 1. Kevin Warwick, <i>Artificial Intelligence: The Basics</i>, Routledge, Taylor & Francis Group, 2012. 2. G.F. Luger, <i>Artificial Intelligence: Structures and Strategies for Complex Problem Solving</i>, 6th ed., Pearson Education, 2009. 3. S. Lucci and D. Kopec, <i>Artificial Intelligence in the 21st Century</i>, Mercury Learning and Information, 2013. 4. P.H. Winston, <i>Artificial Intelligence</i>, 3rd ed., Addison-Wesley, 1992. 5. R. Pfeifer and J. Bongard, <i>How the Body Shapes the Way We Think: a New View of Intelligence</i>, The MIT Press, 2007. 6. M. Negnevitsky, <i>Artificial Intelligence: A Guide to Intelligent Systems</i>, 3rd Edition, Addison-Wesley, 2011. 7. T.M. Georges, <i>Digital Soul: Intelligence Machines and Human Values</i>, Westview Press, 2003. 8. J.S. Hall, <i>Beyond AI: Creating the Conscience of the Machine</i>, Prometheus books, 2007. 9. J.P. Hogan, <i>Mind Matters: Exploring the World of Artificial Intelligence</i>, The Ballantine Publishing Group, 1997. 10. Selected science fiction books and movies. 11. Selected publications from relevant journals. 									
Last Updated	July 2016									
Prepared by	Dr Z. Chi									