

國立中興大學教學大綱

英文

課程名稱	(中) 智慧科技(7652)					
	(Eng.) Intelligent Technologies					
開課單位	科管碩專					
課程類別	選修	學分	3	授課教師	沈培輝	
選課單位	科管碩專 / 碩專班	授課使用語言	中/英文	英文/EMI	開課學期	1121
課程簡述	<p>This course intends to introduce the core concepts and ideas of intelligent technologies. Student will have to understand the evolution of technologies and then the intelligent technologies. Besides, technological applications of intelligent technologies will be presented. The working principles of some commercial products which integrate multiple intelligent technologies will be elucidated.</p> <p>Medium of instruction: Chinese (lecturing; assignments and reports) and English (teaching materials).</p> <p>Use of ChatGPT: It is allowed. Student needs to declare in each assignment and the project report how did you use the ChatGPT. Furthermore, student has to ensure that (1) no content generated by the ChatGPT is incorrect; (2) the content is logical. Professor John Sum will definitely read all your assignments and the project report. You will be requested to clarify if there is any content not true or not logical.</p>					
先修課程名稱					課程含自主學習	N
課程與核心能力關聯配比(%)				課程目標之教學方法與評量方法		
課程目標	核心能力	配比(%)	教學方法	評量方法		
<p>Course Objectives</p> <p>=====</p> <p>1. To introduce the evolution & impacts of intelligent technologies.</p> <p>2. To introduce some of the latest technologies in artificial intelligence and machine learning.</p> <p>3. To introduce potential applications of intelligent technologies.</p>			<p>專題探討/製作</p> <p>習作</p> <p>討論</p> <p>講授</p>	<p>書面報告</p> <p>口頭報告</p>		
授課內容(單元名稱與內容、習作/每週授課、考試進度-共18週)						
週次	授課內容					
第1週	<p>Chapter 1: Introduction to Intelligent Technology</p> <p>1.1 Course outline and assessment.</p> <p>1.2 Intelligence: Human/Animal intelligence vs artificial intelligence.</p> <p>1.3 Intelligent technology and AI/ML.</p>					
第2週	Chapter 1: Introduction to Intelligent Technology					

	<p>1.4 Exemplar intelligent technologies, systems and services.</p> <p>1.5 Five foundational types of intelligent technology.</p> <p>1.6 Intelligent infrastructure.</p> <p>1.7 Issues in intelligent technology.</p>
第3週	<p>Chapter 2: History of AI</p> <p>2.1 Evolution of technology.</p> <p>2.2 Evolution of AI.</p>
第4週	<p>Chapter 3: First Foundational Type of iTech</p> <p>3.1 National language processing (NLP)</p> <p>3.2 Voice assistant: Alexa, Google Assistant and Siri.</p> <p>3.3 Machine translator: Google Translate.</p> <p>3.4 ChatBot: Google Bard and OpenAI ChatGPT.</p> <p>3.5 Epilog:</p> <p>-- 3.5.1 Text-to-text (document summarization, paraphrasing)</p> <p>-- 3.5.2 Voice-to-text.</p>
第5週	<p>Chapter 4: Second Foundational Type of iTech</p> <p>4.1 Image processing: Pattern/Object recognition.</p> <p>4.2 Character recognition.</p> <p>-- 4.2.1 Optical character recognition.</p> <p>-- 4.2.2 Car plate recognition.</p> <p>4.3 Object recognition.</p> <p>-- 4.3.1 Image/Photo tagging for untagged image/photo.</p> <p>-- 4.3.2 Image/Photo captioning for uncaptioned image/photo.</p> <p>-- 4.3.3 ImageNet challenge (Boosting the rise of AI research in 2010).</p> <p>4.4 Multiple-Image processing.</p> <p>-- 4.4.1 Object and motion detection.</p> <p>-- 4.4.2 Auto-driving.</p> <p>-- 4.4.3 Autonomous system.</p> <p>4.5 Epilog: Image-to-text and video-to-text.</p>
第6週	<p>Chapter 5: Third Foundational Type of iTech</p> <p>5.1 Robotic.</p> <p>5.2 Industrial robot.</p> <p>-- 5.2.1 Manufacturing automation.</p> <p>-- 5.2.2 Working a some danger zones.</p> <p>5.3 Humanoid robot for mimicking human body movement.</p> <p>5.4 Military robot.</p> <p>5.5 Exploring outer-space.</p> <p>5.6 Epilog:</p> <p>-- 5.6.1 Can a robot decide who is enemy?</p> <p>-- 5.6.2 Can a robot kill the enemy?</p>
第7週	<p>Chapter 6: Forth Foundational Type of iTech</p> <p>6.1 Game playing.</p> <p>6.2 IBM Deep Blue.</p> <p>6.3 Alpha Go.</p> <p>6.4 Poker game.</p> <p>6.5 Epilog</p> <p>-- 6.5.1 Would an AI player bluff?</p> <p>-- 6.5.2 Are they intelligent?</p>
第8週	<p>Chapter 7: Fifth Foundational Type of iTech</p> <p>7.1 Nature inspired optimization algorithms.</p> <p>7.2 Industrial applications.</p>

	<ul style="list-style-type: none"> -- 7.2.1 Production cost reduction. -- 7.2.2 Production process scheduling. -- 7.2.3 Logistics. -- 7.2.4 Workflow management. <p>7.3 Key ideas.</p> <ul style="list-style-type: none"> -- 7.3.1 Simulation annealing. -- 7.3.2 Genetic algorithm and evolutionary computing. -- 7.3.3 Big data analytic. <p>7.4 Epilog: Are they really intelligent?</p>
第9週	Project progress report.
第10週	<p>Chapter 8: Key Concepts in Intelligent Technology</p> <p>8.1 AI model.</p> <ul style="list-style-type: none"> -- 8.1.1 Just a mathematical model with lot of parameters. -- 8.1.2 Capturing the complicated regular patterns from a dataset. <p>8.2 Evolution.</p> <ul style="list-style-type: none"> -- 8.2.1 Simple (classical) models. -- 8.2.2 Complex (contemporary) models. -- 8.2.3 Model made up of multiple (thousands of) complex models.
第11週	<p>Chapter 8: Key Concepts in Intelligent Technology</p> <p>8.3 Learning (i.e. model building) from a set of data.</p> <p>8.4 Epilog</p> <ul style="list-style-type: none"> -- 8.4.1 Data collection. -- 8.4.2 Representation of non-numeric data. -- 8.4.3 Human-in-a-loop learning. -- 8.4.4 Model bias and data poisoning. -- 8.4.5 Technological support: Internet and cloud.
第12週	<p>Chapter 9: Research & Development in iTech</p> <p>9.1 Intelligent infrastructure.</p> <p>9.2 Foundation models: Academic and industry.</p> <p>9.3 AI as a service: Industry.</p> <p>9.4 Intelligent infrastructure: Industry.</p> <p>9.5 Intelligent services: Industry.</p> <p>9.6 Epilog</p> <ul style="list-style-type: none"> -- 9.6.1 Increasingly demand on the use of cloud XPU (i.e. GPU, TPU and IPU). -- 9.6.2 AI at the edge: Use of AI without connecting to the Internet?
第13週	<p>Chapter 10: XYZ-To-Text and Text-To-XYZ</p> <p>10.1 XYZ-To-Text.</p> <ul style="list-style-type: none"> -- 10.1.1 Everything observable instance in the nature could be converted to text. -- 10.1.2 All observable instances are encoded and collected for training an AI model. -- 10.1.3 XYZ = Measurement data, text, photo, voice or video. -- 10.1.4 Internet-of-Thing == Internet-of-Text. <p>10.2 Text-To-XYZ.</p> <ul style="list-style-type: none"> -- 10.2.1 Text to text: Story writing. -- 10.2.2 Text to speech. -- 10.2.3 Text to image. -- 10.2.4 Text to video. <p>10.3 Epilog</p> <ul style="list-style-type: none"> -- 10.5.1 Fake news. -- 10.5.2 Fake images. -- 10.5.3 Fake videos. -- 10.5.4 Knowledge generation?

第14週	<p>Chapter 11: Personal Applications of iTech</p> <p>11.1 Examples.</p> <ul style="list-style-type: none"> -- 11.1.1 Topic survey (informal survey). -- 11.1.2 Document preparation (spelling check and correction, grammar check, paraphrasing). -- 11.1.3 Search keywords recommendation (Google search engine and Bing). -- 11.1.4 Document translation (Goolge Translate). -- 11.1.5 Image/Photo editing. -- 11.1.6 Voice command to PC/Phone. -- 11.1.7 Driving, parking and route recommendation. -- 11.1.8 Product recommendation. <p>11.2 Effective use of iTech.</p> <ul style="list-style-type: none"> -- 11.2.1 A user should be able to complete the task even if no iTech has been used. -- 11.2.2 A user should be able to determine in which step which iTech is helpful. -- 11.2.3 A user should be able to justify if the result is making sense. -- 11.2.4 A user should be able to identify the limitation of the use of an iTech. -- 11.2.5 A user should use an iTech as an assistant role but should not survive on the iTech.
第15週	<p>Chapter 12: Business & Industrial Applications of iTech</p> <ul style="list-style-type: none"> 12.1 Administration. 12.2 Marketing. 12.3 Customer support. 12.4 Manufacturing. 12.5 Logistics.
第16週	<p>Chapter 13: Societal Issues of AI</p> <ul style="list-style-type: none"> 13.1 AI safety: About 99.99% recognition rate. 13.3 AI ethic: Ethical use of AI systems. Something AI can do but we cannot let it do. 13.3 AI bias: All about the training dataset and the AI models. 13.4 Augmented reality 2.0: Reals and fakes mix-up. 13.5 Job replacement <ul style="list-style-type: none"> -- 13.5.1 Operational (administrative and technical) staff? -- 13.5.2 Middle/Top management staff? 13.6 Roles of human workers in the AI era: From using AI to serving AI? <ul style="list-style-type: none"> -- 13.6.1 Robotic systems maintenance. -- 13.6.2 Cloud systems maintenance. -- 13.6.3 Data labeling/tagging. -- 13.6.4 System testing and user experience testing.
第17週	Project final report (Session I)
第18週	Project final report (Session II)

學習評量方式

Attendance (Discussions + Class Exercises): 30%

Assignments: 20%

Project: 50%

教科書&參考書目(書名、作者、書局、代理商、說明)

Nil

課程教材 (教師個人網址請列在本校內之網址)

1. Lecture notes on the broad (Handwritten by John Sum).
2. Handouts distributed during lectures.
3. Images from Google.
4. Videos from YouTube (mainly documentaries, speeches, lectures and seminars).

5. Articles from magazines.
6. Papers from journals and conferences.
7. Technical reports from research labs.
8. Writings from your assignments, class exercises, discussions.
9. Group project reports

課程輔導時間

By appointment!

聯合國全球永續發展目標

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