



澳門大學
UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU

Major Programme:	Master of Science in Microelectronics & Master of Philosophy in Microelectronics															
Course Type:	<input type="checkbox"/> CM – Compulsory Major <input type="checkbox"/> L&S – Languages and Skills <input type="checkbox"/> * GE – General Education <input type="checkbox"/> MI – Minor <input checked="" type="checkbox"/> RE – Required Elective <input type="checkbox"/> CPE – Community and Peer Education <input type="checkbox"/> FE – Free Elective															
Course Title: (in Chinese and English)	Machine Learning and Analog Accelerators 機器學習與模擬加速器				Suggested Year of Study:		Year 1									
Duration:	<input checked="" type="checkbox"/> Semester Course <input type="checkbox"/> Yearly Course			Credit Units:		3										
Grading System:	<input checked="" type="checkbox"/> Letter Grade <input type="checkbox"/> P/NP			Pre-requisite: (if any)		None										
Medium of Instruction:	English															
Course Description:	This is an introductory course in machine learning tailored for IME students. It covers the topics from classification, regression and statistical signal processing, to more recent techniques such as neural network and deep learning. It also covers the analog approximate computing integrated circuit design considerations for acceleration purpose. The course aims to offer students the fundamental concepts in the advanced artificial intelligence theory with emphasis on hands-on experience through practical examples such as intelligent hardware system implementation and case studies with MATLAB/Python. The verified algorithm can be further implemented on an FPGA for applications such as image/audio recognition.															
Intended Learning Outcomes (ILO):	This course enables students to have: <ul style="list-style-type: none"> • To introduce the essential knowledge in machine learning and deep learning. • To introduce analog accelerators with practical circuit considerations. • To teach students with hands on experience on designing, training and verifying neural networks for image/audio classification problems using MATLAB/Python. • To teach students with hands on experience on implementing the neural networks on an FPGA board for real-time classification. 															
Major Assessment Methods:	Case Study	Role Playing	Student Presentation	Individual project / paper	Group project / paper	Group discussions	Writing Assignment	Exercises & problems	Service learning	Internship	Field study	Company visits	Reading & Writing Assessments / tests	Listening & Oral Assessments / tests	Others (please specify)	
Class Participation / Discussion _____%																
Assignment(s) <u> 30 </u> %							√	√								
Test(s) _____%																
Examination _____%																
Others: Project <u> 70 </u> %			√	√												
Course Content: (topic outline)	<ul style="list-style-type: none"> - Introduction: basic concepts and the evolution of the artificial intelligence with examples and applications - Preliminaries: matrix algebra, probability, random process - Machine learning techniques: classification, regression and statistical signal processing - Neural networks and deep learning: perceptron, feed-forward multilayer neural networks, backpropagation algorithm, deep networks, deep belief networks - Approximate computing cases study - Practical labs: classification, regression, prediction for practical application such as image/audio signal processing using MATLAB/Python and implementing on an FPGA 															