



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)	Microelectronics for the Internet of Things 用於物聯網中的微電子				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:	<p>As enabled by powerful technology, microelectronics have become essential in our daily lives. They are also used in various fields such as healthcare, environmental monitoring, robotics or entertainment, etc. This introductory course in microelectronics is tailored for the Internet of Things (IoTs), which teaches how to use microelectronics circuits to interact with the environment through sensors and communicate wirelessly with the other devices. It covers topics from evaluation and implementation of sensor interface, data conversion, signal processing, and device communications. This customized course from bottom-up based, which starts by introducing the fundamental building blocks in microelectronics for the IoT. Then, followed by system and architectural interface considerations. Finally, the students can realize a basic IoT system based on the available microelectronic module. The course aims to give a basic idea of the key microelectronic building blocks for the IoT application. The students will have hands-on experience through practical design examples and case studies using the microelectronic module.</p>														
Intended Learning Outcomes (ILO):	<p>This course enables students to have:</p> <ul style="list-style-type: none"> • Apply the essential knowledge in basic building blocks and system of the Internet of Things (IoT) system. • Introduce the practical considerations of IoT systems, especially emphasized on sensing and data communication. • Design and verify the various IoT systems with existing modules. 														
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>70</u> %				√	√			√							
Test(s) _____ %															
Examination _____ %															
Others: Project <u>30</u> %			√	√											
Course Content: (topic outline)	<ul style="list-style-type: none"> - Introduction: basic IoT concepts, IoT pass-now-and future, application examples. - IoT system overview: hardware and architectural considerations - Sensor interface building block evaluation and function: Voltage and current domain interface, sensor non-ideality. - Data conversion building block and function: Input interface circuit, Nyquist theory, Quantization theory, Aliasing theory. - Signal processing technique and device communication protocol: synchronous and asynchronous processing. Low energy data transmission protocol introduction. - Practical labs: sensor, data converter and signal processing module function testing. IoT systems implementation and analysis. 														