City University of Hong Kong
Course Syllabus

offered by College/School/Department of Electronic Engineering
with effect from Semester A in 2018/2019

Part I Course Overview

Course Title:	Microcomputer Systems
Course Code:	EE2004
Course Duration:	One Semester (13 weeks)
Credit Units:	3
Level:	B2
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	English
Medium of Assessment:	English
Prerequisites: *(Course Code and Title)*	EE2000 Logic Circuit Design and CS2311 Computer Programming
Precursors: *(Course Code and Title)*	Nil
Equivalent Courses: *(Course Code and Title)*	Nil
Exclusive Courses: *(Course Code and Title)*	Nil

Part II Course Details

1. Abstract

The aim of this course is to introduce the basic structure of modern computer systems and to learn programming computers at the assembly level with the concepts of instruction set architecture, datapath, control unit, memory system and I/O interfaces.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs[#]	Weighting* (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Describe the structure and major components of a microcomputer system		✓	✓	
2.	Explain the idea behind memory hierarchy its use in memory caches and virtual memory.		✓	✓	
3.	Describe how CPUs communicates with peripheral devices.		✓	✓	
4.	Apply C/Assembly programming techniques to simple problems.		✓	✓	✓
** If weighting is assigned to CILOs, they should add up to 100%.*		100%			

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to self-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Teaching and Learning Activities (TLAs)

(TLAs designed to facilitate students' achievement of the CILOs.)

TLA	Brief Description	CILO No.						Hours/week (if applicable)
		1	2	3	4			
Lecture	Explain key concepts in microcomputer systems	✓	✓	✓	✓			3 hrs/week
Tutorial		✓	✓	✓	✓			1 hr/week for 8 weeks, Or 2hrs/week for 13 weeks in Laboratory
Laboratory experiment Or Take-home mini-project	Allow students to gain practical experiences on interacting with the microcomputer system	✓	✓	✓	✓			3 hrs/week for 5 weeks, Or Take-home mini-project

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.						Weighting*	Remarks
	1	2	3	4				
Continuous Assessment: 40%								
Midterm test/tutorial exercise/at least 3 assignments(laboratory experiments, assignments, etc)	√	√	√	√				
Examination: 60% (duration: 2hrs, if applicable)								
** The weightings should add up to 100%.*							100%	

Remark:

To pass the course, students are required to achieve at least 30% in course work and 30% in the examination. When the laboratory experiments are involved in TLA, 75% laboratory attendance rate must be obtained,. When the mini-project is involved in TLA, 75% tutorial attendance rate must be obtained.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	Ability in achieving CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Coursework	Ability in achieving CILOs	High	Significant	Moderate	Basic	Not even reaching marginal levels

6. Constructive Alignment with Major Outcomes

(Please state how the course contribute to the specific MILO(s))

MILO	How the course contribute to the specific MILO(s)
1	An ability to apply knowledge of mathematics, science and engineering. This course contributes to this Program Outcome by teaching elements of them, and giving students practice in applying them.
2	An ability to design and conduct experiments as well as to analyze and interpret data. This course contributes to this Program Outcome by giving students practice in applying them.
3	An ability to design a system, component, or process that conforms to a given specification within realistic constraints is appropriate to the degree discipline. The student will learn design of microprocessor system and integrated them with memory and I/O devices and required to work with the constraints specified in the devices specifications including signal, timing, power consumption and size constraints.
4	An ability to function effectively and responsibly as a team member is appropriate to the degree discipline. The students will work as a group of 2-3 people and split the work in hardware/software areas and coordinate the design into a workable system.
5	An ability to identify, evaluate, formulate and solve engineering problems. This course contributes to this Program Outcome by teaching elements of them, and giving students practice in solving engineering problems.
7	An ability to communicate effectively. This course contributes to this Program Outcome by giving students practice in report writing.
10	An ability to use necessary engineering tools. This course contributes to this Program Outcome by giving students practice in applying them.

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

1. Introduction of Computer Structure: CPU, Memory, and IO, Bus and Data path
2. CPU registers and control units, bus and data path.
3. Assembly Language: Addressing modes, instruction sets, stack, and programming techniques
4. Memory System: Hierarchy: Memory systems. Input/output technique
5. Input/output techniques: programmed I/O, interrupt and DMA

Laboratory Experiments:

1. Assembly language programming
2. I/O programming: Interacting with 7-segment LEDs and keypads
3. Interfacing with peripheral devices, such as timers and EEPROM.
4. Case study of serial communication protocols.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

1.	Lecture/tutorial notes

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Katzen, S, "The Essential PIC18 Microcontroller," Springer-Verlag, London, 2010.
2.	Mazidi, MA, McKinlay, RD and Causey, D, "PIC Microcontroller and Embedded Systems Using Assembly and C for PIC18," Pearson Education, New Jersey, 2008.
3.	Huang, HW, "PIC Microcontroller: An Introduction to Software and Hardware Interfacing," Delmar Cengage Learning, Clifton Park, NY, 2005.