

# Modern Academy for Engineering & Technology

Computer Engineering and Information Technology Department

## Course Specification

### CMP 410: Microprocessor Based-Systems

#### A- Affiliation

**Relevant program:** Computer Engineering and Information Technology BSc Program  
Electronic Engineering and Communication Technology BSc Program

**Department offering the program:** Electronic Engineering and Communications Technology Department  
Computer Engineering and Information Technology Department

**Department offering the course:** Computer Engineering and Information Technology Department

**Date of specifications approval:** September 2015

#### B - Basic information

**Title:** Microprocessor Based-Systems      **Code:** CMP 410      **Level:** Senior-1, 7<sup>th</sup> Semester

**Credit Hours:** 3      **Lectures:** 2      **Tutorial/Exercise:** 1      **Practical:** 2  
**Pre-requisite:** CMP 211

#### C - Professional information

##### 1 – Course Learning Objectives:

By the end of this course, the students should demonstrate the knowledge and understanding the architecture of microprocessor and microcontroller. In addition to recognize their addressing modes, binary decoding, assembly language programming. Besides understanding the basic concepts of interfacing between the processors and their memories, input/output units. They should be able to design digital systems based on the microprocessor and microcontroller.

##### 2 - Intended Learning Outcomes (ILOS)

###### a - Knowledge and understanding:

On successful completion of the course, the student should demonstrate knowledge and understanding of:

- a1- The architecture of microprocessor and microcontroller (A9, A15, A18).
- a2- The assembly instructions for the Intel microprocessor and microcontroller (A5, A14).
- a3- The memory architecture for the microprocessor and microcontroller (A4, A14).
- a4- Physical, logical and effective addresses for Intel microprocessor (A5, A9, A16).
- a5- Instruction pipeline technique for the microprocessor (A4, A14, A16).
- a6- The addressing modes for the microprocessor and microcontroller (A4, A14).
- a7- The Instruction formats for microprocessor and microcontroller (A4, A14).
- a8- The Memory interfacing with microprocessor and microcontroller (A4, A9, A14).
- a9- The interfacing of different digital components with the microprocessor and microcontroller (A4, A14).

###### b - Intellectual skills:

On successful completion of the course, the student should be able to:

- b1- Recognize between the architecture of microprocessors and microcontrollers (B2, B4, B9).
- b2- Write assembly programs for the Intel microprocessor and microcontroller (B3, B13, B17).
- b3- Analyze the characteristics of the Intel microprocessors and microcontrollers (B1, B2, B11).
- b4- Investigate the effect of different addressing modes for microprocessor and microcontroller (B5, B6).

- b5- Solve engineering design based on the microcontrollers MCS-51 in mini-project (B12, B17).  
b6- Recognize the connections for the microprocessor and microcontroller (B11, B16).

**c - Professional and practical skills:**

On successful completion of the course, the student should be able to:

- c1- Write assembly code for Intel microprocessor and microcontroller (C5, C14, C15).  
c2- Check and Debug syntax errors in the assembly code (C6, C12, C14).  
c3- Use software assembler to convert the assembly code to machine code (C5, C14, C15).  
c4- Design systems (mini-project) for MCS-51 depend on software simulator program (C6, C14, C15).  
c5- Use the hardware kit to check the validation for their designs (C5, C6, C15).

**d - General and transferable skills:**

On successful completion of the course, the student should be able to:

- d1- Work in a team and involve in group in mini-projects (D5, D7).  
d2- Communicate effectively and present data and results in hard and soft copies (D3).  
d3- Search for information in libraries and internet (D5, D7).  
d4- Practice self-learning and preparing written reports (D7, D9).

**Course Contribution in the Program ILO's**

ILO's		Program ILO's
A	Knowledge and understanding	A4, A5, A9, A14, A15, A16, A18
B	Professional and practical skills	B1, B2, B3, B4, B5, B6, B9, B11, B12, B13, B16, B17
C	Intellectual skills	C5, C6, C12, C14, C15
D	General and transferable skills	D3, D5, D7, D9

**3 – Contents**

Topic	Lecture hours	Tutorial hours	Practical hours
➤ The architecture of microprocessor and microcontroller.	3	2	--
➤ Assembly instructions for MCS-51.	3	1	4
➤ The Addressing modes for MCS-51.	2	1	--
➤ The instruction formats for MCS-51.	2	1	4
➤ The timers and counters.	3	2	2
➤ The interrupts and its priority.	3	2	4
➤ The serial and parallel communications with processors.	3	2	4
➤ The interface with external memories and PPI.	3	2	4
➤ The interface with input units (such as sensors, keypad ...etc).	3	1	2
➤ The interface with output units (such as motors, monitors ...etc)	3	1	2
➤ Task for mini-project.	2	--	4
Total hours	30	15	30

**4 - Teaching and Learning and Assessment methods:**

Course ILO's		Teaching Methods								Learning Methods				Assessment Method							
		Lecture	Presentations and Movies	Discussions and seminars	Tutorials	Problem solving	Laboratory & Experiments			Researches and Reports	Modeling and Simulation			Written Exam	Practical Exam	Quizzes	Term papers	Assignments			
Knowledge & Understanding	a1	1	1	1	1					1	1			1	1			1			
	a2	1	1		1		1				1			1	1	1		1			
	a3	1	1		1									1	1		1	1			
	a4	1	1	1	1		1							1			1	1			
	a5	1	1		1									1		1		1			
	a6	1	1		1	1								1			1	1			
	a7	1	1		1	1	1				1			1		1	1	1			
	a8	1	1		1					1				1	1		1	1			
	a9	1	1	1	1	1	1			1	1			1	1			1			
Intellectual Skills	b1	1	1	1	1					1	1			1	1			1			
	b2	1	1		1		1				1			1	1	1		1			
	b3	1	1		1									1	1		1	1			
	b4	1	1		1		1							1			1	1			
	b5	1	1		1									1		1		1			
	b6	1	1		1	1								1			1	1			
Applied Professional Skills	c1	1	1			1	1			1	1				1						
	c2						1			1	1				1						
	c3	1				1	1			1	1				1						
	c4	1				1	1			1	1				1						
	c5						1				1				1						
General Tran. Skills	d1	1		1	1	1				1	1						1				
	d2	1				1				1							1				
	d3									1											
	d4					1				1							1				

## 5- Assessment Timing and Grading:

Assessment Method	Timing	Degrees
Semester Work: seminars, quizzes assignments and reports	By Weekly	10
Mid-Term Exam	6-th Week	10
Practical Exam	Fifteenth week	20
Written Exam	Sixteenth week	60
Total		100

## 6- List of references:

### 6-1 Course notes:

Assem B, The Microprocessor Based Systems, lecture note, 2015

### 6-2 Required books:

Rolin D. McKinlay, Janice G. Mazidi, Danny Causey and Muhammad Ali Mazidi, The 8051 Microcontroller, Prentice Hall, 2012

### 6-3 Recommended books:

Yogendra Gandole, A Text Book of Advanced Microprocessors and Microcontroller, Lambert Academic

Publishing, 2012.

**6-4 Periodicals, Web sites, etc.**

<http://www.intel.com>

<http://www.cpu-world.com>

<http://www.emu8086.com/>

<http://www.8052.com>

<http://www.keil.com/>

<http://www.mikroe.com/>

**7- Facilities required for teaching and learning:**

- Hardware emulators and kits.
- Simulator software programs.
- Data show

**Course coordinator:**

Dr. Assem Badr

**Head of the Department:**

Prof. Dr. Said Gawish

**Date:**

September 2015