Republic of Yemen

Ministry of Higher Education & Scientific Research

Council of Academic Accreditation & Quality

Assurance of Higher Education (CAQA)

21 September University for medical and Applied Science

Faculty of Engineering and Computer

Department of Biomedical Engineering

Program of Biomedical Engineering

Course Specification of

Microprocessors & Microcontrollers

Course Code. (07.02.722)

2024

T4: This Template is Developed and Approved by CAQA-Yemen, 2023

Prepared by:	Reviewed by:	Head of the Department:	Quality Unit:
Assoc. Prof. Farouk Al-Fahaidy	Dr. -----	Dr. Awadh Al-Kubati	Dr. Mohammed Al-Shamahi

I. General Information:

1.	Course Title:	Microprocessors and Microcontrollers				
2.	Course Code:	07.02.722				
3.	Credit Hours:	Credit Hours	Theory Contact Hours		Practical Contact Hours	
			Lecture	Tutorial /Seminar	Lab	Clinical
		3	2	--	2	--
4.	Level/ Semester at which this Course is offered:	--- Level / ---- Semester				
5.	Pre –Requisite (if any):	Logic Circuits & Programming I				
6.	Co –Requisite (if any):	------				
7.	Program (s) in which the Course is Offered:	Bachelor of Biomedical Engineering				
8.	Language of Teaching the Course:	Mixed (Arabic & English)				
9.	Location of Teaching the Course:	Faculty of Medical Technology				
10.	Prepared by:	Assoc. Prof. Farouk Al-Fahaidy				
11	Date and Number of Approval by Council:					

II. Course Description:

This course aims to introduce the basic concepts and principles of microprocessors (MPs) and microcontrollers (MCs) based on their architectures, programming, and applications in the field of biomedical engineering. The MP/MC plays the main processing and controlling unit in different biomedical instrumentations. Topics covers, an introduction to MP/MC architectures & units, the 8086/8088-Mps internal architecture, the 8088-MP IC interfacing and assembly programming, the 8051-MC's GPIO ports interfacing & features and assembly/Micro-C programming. Throughout

practical Lab experiments & computer-based lab works as well as, course project work, students will develop their practices skills in simulation, programming and implementation of context-based systems using the MP/MC-based systems.

III. Course Intended Learning Outcomes (CILOs) : Upon successful completion of the course, students will be able to:		Referenced PILOs		
	A. Knowledge and Understanding:	**I, P or M/A**		
a1	Explain basic concepts and principles of MPs/MCs-based systems design, programming and applications in the field of biomedical engineering and healthcare environment.	I	A1	Explain the appropriate models, theories, mathematical foundations, and techniques related to biomedical engineering technology context.
a2	Describe the theories and internal architecture of the microprocessors/ microcontrollers as well as their differences, features & capabilities.	I	A2	Clarify the biomedical devices maintenance principles and how these are important for solving biomedical devices and equipment's problems in health environment.
	B. Intellectual Skills:			
b1	Solve healthcare domain problems related to MPs/MCs-based systems using suitable software packages, programming language, and proper electronical elements, devices & ICs.		B2	Analyze the impacts of problems related to the Biomedical equipments and its solution principles in a creative manner by using a systematic and analytical thinking methods.
	C. Professional and Practical Skills:			
c1	Use different programming environments & IDE in the development & integrating of controlling programs and for simulation of the suggested solutions while solving practices	P	C2	Evaluate an engineering technique, modern analytical tools and required computer programs to analyzing and solve the problems of medical

	problems related to healthcare fields.			devices.
c2	Carry-out lab & environmental experiments for maintenance and experimentation in biomedical engineering practices.	P	C3	Develop an engineering approach, engineering equipment, instruments to maintenance and conduct experiments, and present results in the biomedical engineering practice.
	D. Transferable Skills:			
d1	Demonstrate the ability to work in stressful environments within different constraints	A	D1	Function effectively as an individual, team member, or leader in activities relevant to biomedical engineering, and collaborating to achieve a shared objective.
d2	Communicate well in both orally and in written forms.	M	D2	Acquire entrepreneurial skills and effectively manage tasks, time, processes and resources.
I= Introduced, P=Practiced or M/A= Mastered/Advanced				

	(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
a1	Describe the theories and internal architecture of the microprocessors/ microcontrollers as well as their differences, features & capabilities.	▪ Interactive lectures & examples, ▪ Interactive class discussions, ▪ Exercises and home works.	▪ Written tests (mid and final terms and quizzes), ▪ Coursework activities assessment, ▪ Home works and assignments.
a2	Explain basic concepts and principles of MPs/MCs-based systems design, programming and applications in the field of		

	biomedical engineering and healthcare environment.		
	(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
b1	Solve healthcare domain problems related to MPs/MCs-based systems using suitable software packages, programming language, and proper electronical elements, devices & ICs.	▪ Interactive lectures & examples, ▪ Interactive class discussions, ▪ Case studies, ▪ Exercises and home works, ▪ Laboratory/Practical experiments-based session, ▪ Computer laboratory-based sessions, ▪ Directed self- study, ▪ Problem based learning, ▪ Team work (cooperative learning), ▪ Project.	▪ Written tests (mid and final terms and quizzes), ▪ Lab\Project report ▪ Practical lab performance assessment, ▪ Coursework activities assessment, ▪ Home works and assignments, ▪ Presentations.
	(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:		
	Course Intended Learning Outcomes	**Teaching Strategies**	**Assessment Strategies**
c1	Use different programming environments & IDE in the development & integrating of controlling programs and for simulation of the suggested solutions while solving practices problems related to healthcare fields.	▪ Exercises and home works, ▪ Laboratory/Practical experiments-based session, ▪ Computer laboratory-based sessions, ▪ Directed self- study, ▪ Problem based learning, ▪ Team work (cooperative learning), ▪ Project.	▪ Lab\Project report ▪ Practical lab performance assessment, ▪ Coursework activities assessment, ▪ Home works and assignments, ▪Presentations.
c2	Carry-out lab & environmental experiments for maintenance and experimentation in		

	biomedical engineering practices.		

(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:

	Course Intended Learning Outcomes	Teaching Strategies	Assessment Strategies
d1	Demonstrate the ability to work in stressful environments within different constraints	▪ Exercises and home works, ▪ Case studies, ▪ Laboratory/Practical experiments-based session, ▪ Computer laboratory-based sessions, ▪ Directed self- study, ▪ Problem based learning, ▪ Team work (cooperative learning), ▪ Project.	▪ Lab\Project report ▪ Practical lab performance assessment, ▪ Home works and assignments, ▪ Coursework activities assessment, ▪ Presentations.
d2	Communicate well in both orally and in written forms.		

IV. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	**Introduction to MP/MC & Computing**	– Course Orientations, Aims & Objectives, – Introduction to Microprocessors & Microcontrollers, – Numbering & Coding Systems.	1	2	a2
2	**Internal Organization of Computer**	– Introduction to Internal Organization of Computer, Relation between Internal organization, Internal working of computer, – Brief history of the 80x86 family, Inside the 8088/8086.	1	2	a1, a2
3	**The 80x86 Microprocessor**	– Introduction to the Assembly Programming, Program	1	2	a1, a2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		Segments, – The 80x86-MP's Memory Addressing Modes, Logical, Offset & Physical Addresses Calculation, Demonstration with Examples.			
4	**Assembly Language Programming**	– Layout of Assembly Programs, Directives & A Sample Program, Assemble, link, and Run a Program, – Flag Register & Control Transfer Instructions, Data types and Definitions	1	2	a1, a2, b1
5	**Arithmetic and Logic Instructions and Programs**	– Unsigned Addition & Subtraction, – Unsigned Multiplication & Division, – Logical & Shift Instructions and Sample Programs.	1	2	a1, a2, b1
6	**BCD, ASCII, Bios & Dos Programming in Assembly**	– BCD & ASCII operands and Instructions, – Bios INT 10H Programming: using INT 10H, Dos Interrupt INT 21H: using INT 21H with different I/O Functions.	1	2	a1, a2, b1
7	**Strings & Tables and Macros & Modular Programming**	– String Instructions & Look-up Tables Programming, – Define Macro in Assembly, Define the Local Variable in Macro, and including the Macro in another File – Modular Programming, Advantages, Break a Large Program into Modules, Code the Modules and calling the Program, EXTRN Directive, PUBLIC Directive, Link a Subprograms into one Executable Program.	1	2	a1, a2, b1
8	**Mid-Term Theoretical**	– ALL Previous Topics	1	2	a1, a2, b1

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
	Exam				
9	The 8086/8088 MP IC & Interfacing with the 8255-IC	– The 8086/8088-MP IC, Pins Functions, Modes of Operations, Memory & I/O Ports Addressing & Address Decoding Circuits, – Interfacing & Programming of the 8088-Mp with I/O peripherals such as, Switch, LEDs and Sensors – The 8255-PPI IC, IC Pins, Configuration and Interfacing with Keypad & LCD.	2	4	a1, a2, b1, b2
10	Introduction to the 8051 Microcontroller Family & Programming	– Introduction to 8051 family MCs, IC for 8051, features like ports, Timers, and Serial Modules, Internal RAM, General Purpose Registers (GPRs), Special Function Registers (SFRs), – Basic Assembly Programming Instructions, – Flowchart standard symbols.	1	2	a1, a2, b1
11	The 8051 Programming	– Assembly Programming, Data Transfer Instructions, Addressing Modes, Data Processing Instructions, Program Branching Instructions, and Stack, – TIME DELAY Generation in 8051 MC.	1	2	a1, a2, b1
12	The 8051 Interfacing with Assembly Programming	– The 8051-MC Interfacing, I/O Ports, LEDs, Seven-Segments, Switches, Keypad, PWM, DC-motor, Stepper motor & Alphanumeric LCD – ADC, DAC Modules.	2	4	a2, b1, b2
13	The 8051-MC's Interrupts	– Interrupts Programming, Steps in executing an interrupt, Interrupt Sources, Interrupt Vectors, Interrupt Enable (IE) register, External interrupt, Interrupt	1	2	a2, b1, b2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
		Priorities.			
14	Final Theoretical Exam	– ALL Topics	1	2	a1, a2, b1, b2
Number of Weeks /and Units Per Semester			16	32	

B. Practical Aspect (Lab/Clinical) (if any):

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	**MP Lab & Computer based Lab Orientation:** – Lap equipment and simulation Tools orientations – Installation of 8086/8088-Mps simulators and Proetus Simulator.	1	2	a2, b1, c1
2	– MOV and ADD assembly instructions illustrating memory addressing modes	1	2	b1, c1, d1
3	– Conditional Assembly Instructions, – Arithmetic, Shift & Logic & Shift Assembly Instructions.	2	4	b1, c1, c2. d1
4	– BCD, ASCII, BIOS & Dos Assembly	1	2	b1, c1, d1
5	– String Assembly Instructions & Lookup Tables Programming	1	2	b1, c1, d1
6	– **Midterm Practical Exam**	1	2	b1, c1, c2, d1
7	– Assembly programming: Macros and Modular Programming, – Building Assembly Program with Subroutines in Modular Programming.	2	4	b1, c1, c2, d1, d2
8	– The 8086/8088-Mps interfacing with Peripherals & Programming.	2	4	b1, c1, c2, d1,

No.	Tasks/ Experiments	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
				d2
9	– The 8051-MC Interfacing and Programming with Peripherals, – Demonstrating Interrupts Programming with 8051-MC.	2	4	b1, c1, c2, d1, d2
10	– **Projects Presentation**	1	2	a1, a2, b1, c1, c2, d1, d2
11	– **Final Practical Exam**	1	2	b1, c1, c2, d1
Number of Weeks /and Units Per Semester		**15**	**30**	

C. Tutorial Aspect (if any):

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
1	NONE			
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

No.	Tutorial	Number of Weeks	Contact Hours	Learning Outcomes (CILOs)
13				
14				
Number of Weeks /and Units Per Semester				

VII. Assignments & Reports:

No.	Assignments	Week Due	Mark	Aligned CILOs (symbols)
1	Assignment 1: Memory addressing modes and Assembly instructions (Arithmetic & Logic)	4th & 5th	3	a1, a2, b1, d1
2	Assignment 2: Subroutines and Modular Programming in assembly	6th & 7th	3	a1, a2, b1, d1
3	Assignment 3: Interfacing 8086/8088-Mps, Report 1: Short Report on MP/MC-based Systems, Technologies, Programming and Simulation.	9th to 11th	5	a1, a2, b1, c1, d1, d2
4	Assignment 4: Interfacing with 8051-MC.	12th & 13th	4	a1, a2, b1, c1, d1, d2
Total			15	

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
1	Assignments & Reports	4th to 13th	15	10%	a1, a2, b1, c1, d1, d2

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment	Aligned Course Learning Outcomes
2	Quizzes 1 & 2	6th & 12th	10	6.67%	a1, a2, b1, c1, d1, d2
3	Mid-Term Practical Exam	7th	15	10%	b1, c1, c2, d1
4	Mid-Term Theoretical Exam	8th	20	13.33%	a1, a2, b1
5	Final Practical Exam including Project Presentation & Evaluation	15th	30	20%	a1, a2, b1, c1, c2, d1, d2
6	Final Theoretical Exam	16th	60	40%	a1, a2, b1
Total			150	100%	

IX. Learning Resources:

- *Written in the following order:* Author, Year of publication, Title, Edition, Place of publication, Publisher.

1- Required Textbook(s) (maximum two):

1- M. Mazidi, and J. Mazidi, 2002, **The 80x86 IBM PC and Compatible Computers Assembly Language, Design and Interfacing**, 4th Edition, UK, Prentice Hall

2- M. Mazidi, and J. Mazidi, 2002, **The 8051 Microcontroller, Design and Interfacing**, 4th Edition, UK, Prentice Hall.

2- Essential References:

1- Richard C. Detmer, 2014, **Introduction to 80x86 Assembly Language and Computer Architecture**, 3rd edition, UK, Jones & Bartlett Learning.

1- Lyla B Das, 2010, **The X86 Microprocessors: Architecture and Programming (8086 to Pentium)**, 2nd Edition, New Delhi india, Dorling Kindersley.

2- John E. Uffenbeck, **The 80x86 Family: Design, Programming, and Interfacing**.

3- Electronic Materials and Web Sites etc.:

Websites:

Courses:

1- http://nptel.iitm.ac.in

2- https://ocw.mit.edu/courses

Journals

1. http://www.sciencedirect.com/
2. http://dl.acm.org/dl.cfm
3. http://ieeexplore.ieee.org/Xplore/guesthome.jsp
4. http://www.emeraldinsight.com
5. http://www.scopus.com/home.url
6. http://link.springer.com/

Other Web Sources:

1……

2…….

X. Course Policies: (Based on the Uniform Students' By law (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.

Faculty of Medical Technology

Department of Biomedical Engineering

Program of Biomedical Engineering

Course Plan (Syllabus) of Microprocessors & Microcontrollers

Course Code. 07.02.722

2024/2025

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member:	Assoc. Prof. Farouk Al-Fahaidy	Office Hours						
Location& Telephone No.:	777909815							
E-mail:	farouqakh@gmail.com	SAT	SUN	MON	TUE	WED	THU	

II. Course Identification and General Information:

1	Course Title:	Microprocessors & Microcontrollers			
2	Course Code & Number:	07.02.722			
3	Credit Hours:	Credit Hours	Theory Hours		Lab. Hours
			Lecture	Exercise	
		3	2	--	2
4	Study Level/ Semester at which this Course is offered:	3rd Level / 2nd Semester			
5	Pre –Requisite (if any):	Digital Logic Design & Programming I			
6	Co –Requisite (if any):	None			
7	Program (s) in which the Course is Offered:	Bachelor of Biomedical Engineering			
8	Language of Teaching the Course:	Arabic & English			
9	Study System:				
10	Mode of Delivery:	Full Time			
11	Location of Teaching the Course:	Faculty of Medical Technology			
12	Prepared by:	Assoc. Prof. Farouk Al-Fahaidy			
13	Date of Approval:				

III. Course Description:

This course aims to introduce the basic concepts and principles of microprocessors (MPs) and microcontrollers (MCs) based on their architectures, programming, and applications in the field of biomedical engineering. The MP/MC plays the main processing and controlling unit in different biomedical instrumentations. Topics covers, an introduction to MP/MC architectures & units, the 8086/8088-Mps internal architecture, the 8088-MP IC interfacing and assembly programming, the 8051-MC's GPIO ports interfacing & features and assembly/Micro-C programming. Throughout practical Lab experiments & computer-based lab works as well as, course project work, students will develop their practices skills in simulation, programming and

implementation of context-based systems using the MP/MC-based systems.

IV. Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

	A. **Knowledge and Understanding:**
a1	Describe the theories and internal architecture of the microprocessors/ microcontrollers as well as their differences, features & capabilities.
a2	Explain basic concepts and principles of MPs/MCs-based systems design, programming and applications in the field of biomedical engineering and healthcare environment.
	B. Intellectual Skills:
b1	Solve healthcare domain problems related to MPs/MCs-based systems using suitable software packages, programming language, and proper electronical elements, devices & ICs.
	C. Professional and Practical Skills:
c1	Use different programming environments & IDE in the development & integrating of controlling programs and for simulation of the suggested solutions while solving practices problems related to healthcare fields.
c2	Carry-out lab & environmental experiments for maintenance and experimentation in biomedical engineering practices.
	D. Transferable Skills:
d1	Demonstrate the ability to work in stressful environments within different constraints
d2	Communicate well in both orally and in written forms.

V. Course Contents:

A. Theoretical Aspect:

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
1	**Introduction to MP/MC & Computing**	– Course Orientations, Aims & Objectives, – Introduction to Microprocessors & Microcontrollers,	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
		– Numbering & Coding Systems.		
2	Internal Organization of Computer	– Introduction to Internal Organization of Computer, Relation between Internal organization, Internal working of computer, – Brief history of the 80x86 family, Inside the 8088/8086.	1	2
3	The 80x86 Microprocessor	– Introduction to the Assembly Programming, Program Segments, – The 80x86-MP's Memory Addressing Modes, Logical, Offset & Physical Addresses Calculation, Demonstration with Examples.	1	2
4	Assembly Language Programming	– Layout of Assembly Programs, Directives & A Sample Program, Assemble, link, and Run a Program, – Flag Register & Control Transfer Instructions, Data types and Definitions	1	2
5	Arithmetic and Logic Instructions and Programs	– Unsigned Addition & Subtraction, – Unsigned Multiplication & Division, – Logical & Shift Instructions and Sample Programs.	1	2
6	BCD, ASCII, Bios & Dos Programming in Assembly	– BCD & ASCII operands and Instructions, – Bios INT 10H Programming: using INT 10H, Dos Interrupt INT 21H: using INT 21H with different I/O Functions.	1	2
7	Strings & Tables and Macros & Modular Programming	– String Instructions & Look-up Tables Programming, – Define Macro in Assembly, Define the Local Variable in Macro, and including the Macro in another File – Modular Programming, Advantages, Break a Large Program into Modules, Code the Modules and calling the Program, EXTRN Directive, PUBLIC Directive, Link a Subprograms into one Executable Program.	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
8	Mid-Term Theoretical Exam	– ALL Previous Topics	1	2
9	The 8086/8088 MP IC & Interfacing with the 8255-IC	– The 8086/8088-MP IC, Pins Functions, Modes of Operations, Memory & I/O Ports Addressing & Address Decoding Circuits, – Interfacing & Programming of the 8088-Mp with I/O peripherals such as, Switch, LEDs and Sensors – The 8255-PPI IC, IC Pins, Configuration and Interfacing with Keypad & LCD.	2	4
10	Introduction to the 8051 Microcontroller Family & Programming	– Introduction to 8051 family MCs, IC for 8051, features like ports, Timers, and Serial Modules, Internal RAM, General Purpose Registers (GPRs), Special Function Registers (SFRs), – Basic Assembly Programming Instructions, – Flowchart standard symbols.	1	2
11	The 8051 Programming	– Assembly Programming, Data Transfer Instructions, Addressing Modes, Data Processing Instructions, Program Branching Instructions, and Stack, – TIME DELAY Generation in 8051 MC.	1	2
12	The 8051 Interfacing with Assembly Programming	– The 8051-MC Interfacing, I/O Ports, LEDs, Seven-Segments, Switches, Keypad, PWM, DC-motor, Stepper motor & Alphanumeric LCD ADC, DAC Modules.	2	4
13	The 8051-MC's Interrupts	Interrupts Programming, Steps in executing an interrupt, Interrupt Sources, Interrupt Vectors, Interrupt Enable (IE) register, External interrupt, Interrupt Priorities.	1	2
14	Final Theoretical Exam	ALL Topics	1	2

No.	Units/Topics List	Sub Topics List	Number of Weeks	Contact Hours
Number of Weeks /and Units Per Semester			16	32

B. Case Studies and Practical Aspect:

No.	Tasks/ Experiments	Week Due	Contact Hours
1	**MP Lab & Computer based Lab Orientation:** – Lap equipment and simulation Tools orientations – Installation of 8086/8088-Mps simulators and Proetus Simulator.	1	2
2	– MOV and ADD assembly instructions illustrating memory addressing modes	1	2
3	– Conditional Assembly Instructions, – Arithmetic, Shift & Logic & Shift Assembly Instructions.	2	4
4	– BCD, ASCII, BIOS & Dos Assembly	1	2
5	– String Assembly Instructions & Lookup Tables Programming	1	2
6	– **Midterm Practical Exam**	1	2
7	– Assembly programming: Macros and Modular Programming, – Building Assembly Program with Subroutines in Modular Programming.	2	4
8	– The 8086/8088-Mps interfacing with Peripherals & Programming.	2	4
9	– The 8051-MC Interfacing and Programming with Peripherals, – Demonstrating Interrupts Programming with 8051-MC.	2	4
10	**Projects Presentation**	1	2
11	**Final Practical Exam**	1	2
Number of Weeks /and Units Per Semester		15	30

C. Tutorial Aspect:

No.	Tutorial	Number of Weeks	Contact Hours
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
Number of Weeks /and Units Per Semester			

VI. Teaching Strategies of the Course:

- Interactive lectures & examples,
- Interactive class discussions,
- Case studies,
- Exercises and home works,
- Laboratory/Practical experiments-based session,
- Computer laboratory-based sessions,
- Directed self- study,
- Problem based learning,
- Team work (cooperative learning),
- Project.

VII. Assessment Methods of the Course:

- Written tests (mid and final terms and quizzes),

- Short reports,
- Lab\Project report
- Practical lab performance assessment,
- Coursework activities assessment,
- Home works and assignments,
- Presentations.

VIII. Assignments:

No.	Assignments	Week Due	Mark
1	Assignment 1: Memory addressing modes and Assembly instructions (Arithmetic & Logic)	4th & 5th	3
2	Assignment 2: Subroutines and Modular Programming in assembly	6th & 7th	3
3	Assignment 3: Interfacing 8086/8088-Mps, Report 1: Short Report on MP/MC-based Systems, Technologies, Programming and Simulation.	9th to 11th	5
4	Assignment 4: Interfacing with 8051-MC.	12th & 13th	4
Total			15

IX. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1	Assignments & Reports	4th to 13th	15	10%
2	Quizzes 1 & 2	6th & 12th	10	6.67%
3	Mid-Term Practical Exam	7th	15	10%
4	Mid-Term Theoretical Exam	8th	20	13.33%
5	Final Practical Exam including Project Presentation & Evaluation	15th	30	20%
6	Final Theoretical Exam	16th	60	40%

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
Total			150	100%

X. Learning Resources:

- *Written in the following order: Author, Year of publication, Title, Edition, Place of publication, Publisher.*

1- Required Textbook(s) (maximum two):

1- M. Mazidi, and J. Mazidi, 2002, **The 80x86 IBM PC and Compatible Computers Assembly Language, Design and Interfacing**, 4th Edition, UK, Prentice Hall

1- M. Mazidi, and J. Mazidi, 2002, **The 8051 Microcontroller, Design and Interfacing**, 4th Edition, UK, Prentice Hall.

2- Essential References:

1- Richard C. Detmer, 2014, **Introduction to 80x86 Assembly Language and Computer Architecture**, 3rd edition, UK, Jones & Bartlett Learning.

1- Lyla B Das, 2010, **The X86 Microprocessors: Architecture and Programming (8086 to Pentium)**, 2nd Edition, New Delhi india, Dorling Kindersley.

2- John E. Uffenbeck, **The 80x86 Family: Design, Programming, and Interfacing**.

3- Electronic Materials and Web Sites etc.:

Websites:

Courses:

3- http://nptel.iitm.ac.in

4- https://ocw.mit.edu/courses

Journals

7. http://www.sciencedirect.com/
8. http://dl.acm.org/dl.cfm
9. http://ieeexplore.ieee.org/Xplore/guesthome.jsp
10. http://www.emeraldinsight.com
11. http://www.scopus.com/home.url
12. http://link.springer.com/

Other Web Sources:

1……

XI. Course Policies: (Based on the Uniform Students' Bylaw (2007)

1	**Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes.
2	**Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class.
3	**Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed.
4	**Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same.
5	**Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
6	**Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply.
7	**Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration.