



Department of Computer Science and Engineering
Lesson Plan:

Course Title: Microprocessors and Microcontrollers

Level/Term: Mid level

Credit: 03

Prerequisite: Basic knowledge on computer and programming

Session: Spring, 2020

Course Code: EEE 371

Section: A

Contact Hours: 39

Type: Core/Major:

Instructor: Kingshuk Dhar

Class schedule: Saturday (10:00am – 11:30am), Sunday (10:00am – 11:30am)

Counseling Time: Wednesday (03:00pm – 04:00pm)

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Rationale: Intended to enable the learners to familiar with different types of microprocessors and microcontrollers, use the acquired knowledge to understand computer systems and embedded systems circuitry or architectures.

Course Objectives:

- To provide a theoretical & empirical introduction to microcontrollers and microprocessors, assembly language programming techniques, design of hardware interfacing circuit, microcontroller and microprocessor system design considerations.
- To provide the rudimentary concepts to identify the basic elements and functions of contemporary microprocessors and microcontrollers and implicating programming in the instruction sets of microprocessors and microcontrollers (Basically Intel family).
- Designing and maintaining different types of digital projects to fulfill the quotidian life problem in embedded system.

Course Outcomes (COs):

After successful completion of this course, you should be able to:

1. Extend the knowledge about microprocessor and microcontroller architecture, interfacing, and operations.
2. Analyze assembly language instructions or programs which are used in microprocessor and microcontroller operations.
3. Solve the real world problems related with embedded systems and designs.
4. Illustrate microprocessor and microcontroller related circuitry and sensor interfacing.

Assessment: Class tests, quizzes/assignments/homework, class attendance and class participation, midterm exam, final exam.

Text and Reference books:

1. The Intel Microprocessor Architecture, Programming and Interfacing, *Barry B. Brey*.
2. Microprocessors and Interfacing: Programming and Hardware, *Douglas V. Hall*.
3. Advanced Microprocessor and Interfacing, *Badri Ram*.

Lesson Plans (3hours = 1.5*2=26 classes)

Week	Topic	Teaching strategy	Course outcome	Assessment Strategy
Date-1	Introduction to different type of microprocessor: Intel 4004, Intel 8008, Intel 8080, Intel 8085, Intel 8086/8088, Intel 80186, Intel 80286, Intel 80386, Intel 80486,	Lecture, Slide and examples	CO1	Class work
Date-2	Pentium, Pentium Pro, Pentium II, Pentium III, Pentium IV etc. Computer system components, CPU components.	Lecture, Slide and examples	CO1	Class work
Date-3	Introduction to microprocessor based computer system: Number systems, Computer data formats.	Lecture and problem solving	CO1	Class work
Date-4	The microprocessor and its Architecture: Internal Architecture, Real mode memory addressing, Memory paging, flat mode memory.	Lecture and problem solving	CO1	Class work
Date-5	Data movement instruction: MOV, PUSH/POP, Load effective address,	Lecture and problem solving	CO1 CO2	Class work and Home work
Date-6	String Data Transfer, Misc. Data transfer instructions, Assembler details.	Lecture and problem solving	CO1 CO2	Class work and Home work
Date-7	Arithmetic and logic instructions: Addition, Subtraction and comparison,	Lecture and problem solving	CO1 CO2	CT-1
Date-8	Multiplication and Division.	Lecture and problem solving	CO1 CO2	Class work and Home work
Date-9	BCD and ASCII arithmetic, Basic logic instruction,	Lecture and problem solving	CO1 CO2	Class work and Home work
Date-10	Shift and Rotate, String comparison.	Lecture and problem solving	CO1 CO2	Class work and Home work
Date-11	Program Control Instructions: The Jump group, Controlling the flow of assembly language program, Procedures,	Lecture and problem solving	CO1 CO2	Class work and Home work
Date-12	Introduction to Interrupts, Machine control and miscellaneous instructions.	Lecture and problem solving	CO1 CO2	Class work and Home work

Date-13	Review class (Date-1 to 12)	Lecture and problem solving		Class work and Home work
Date-14	Mid Term Examination			Mid Examination
Date-15	8086/8088 Hardware Specification: Pin-outs and the pin functions, Clock generator (8284A), Bus buffering and Latching,	Lecture, Slide and problem solving	CO1 CO3	Class work and Home work
Date-16	Bus Timing, Ready and wait state, Minimum mode, Maximum mode, Summery.	Lecture, Slide and problem solving	CO1 CO3	Class work and Home work
Date-17	Memory Interface: Memory Pin connections, Memory Devices, Address decoding,	Lecture and Slide	CO1 CO3	Class work
Date-18	Memory interface for 8 bit(8088,80188), 16 bit(8086,80186,80286), 32 bit(80386,808486) 64 bit microprocessors, Dynamic Ram.	Lecture and Slide	CO1 CO3	Class work
Date-19	Interrupts: Basic Interrupt Processing, Hardware and software interrupts 8259A Programmable Interrupt Controller.	Lecture and Slide	CO1 CO3	Class work
Date-20	8259A Programmable Interrupt Controller, Expanding Interrupt Structure, and Interrupt Examples.	Lecture and Slide	CO1 CO3	Class work
Date-21	Introduction to Microcontroller: Embedded microcontroller, Differences between micro controller and microprocessor, Instruction sets and buses for microcontroller,	Lecture and Slide	CO1 CO3	Class Performance
Date-22	Types of microcontroller, Embedded and external memory of microcontroller, microcontroller architectural features.	Lecture and Slide	CO1 CO3	CT-2
Date-23	Embedded systems and sensor interfacing: Introduction to different types of embedded system (Arduino, Rasberry PI, Banglabone Black),	Lecture, Slide and Circuit demonstration	CO1 CO3 CO4	Class work and Home work
Date-24	Operation with Sensor interfacing, System driving/controlling, and related circuitry.	Lecture, Slide and Circuit demonstration	CO1 CO3 CO4	Class work and Home work
Date-25	PCB Making and Layout Design: Introduction to PCB design tool (Eagle CAD), Theoretical anatomy of design procedure,	Lecture, Slide and Video clips	CO3 CO4	Class work and Home work

Date-26	Design related terms, Long discussion of Layout design and PCB making.	Lecture, Slide and Video clips	CO3 CO4	Class work and Home work
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Marks distribution:

Description	Marks
Class Attendance/ Participation	10
Class Test	10
Quizzes/Assignments/Home works	10
Midterm	20
Final Exam	50