# Microprocessors and Microcontrollers (EN-225)

## Pre-Requisite(S)

- Digital Logic Design (EN-215)

## Recommended Book(s)

- Barry B. Brey, "The Intel Microprocessors: 8086/8088,80186/80188, 80286, 80386, 80486, Pentium, Pentium Pro Processor, Pentium II, Pentium III, Pentium 4," Seventh Edition,2006, Prentice Hall, ISBN: 0131195069.
- Muhammad Ali Mazidi, Janice Mazidi and Rolin McKinlay, "8051 Microcontroller and Embedded Systems," Second Edition, 2005, Prentice Hall, ISBN: 013119402X

## Reference Book(s)

- Douglas V. Hall, "Microprocessor and Interfacing", Revised Second Edition, 2005, Tata McGraw-Hill, ISBN: 0070601674.
- Han-Way Huang, "PIC Microcontroller: An Introduction to Software & Hardware Interfacing," First Edition, 2004, Thomson Delmar Learning, ISBN: 1401839673.

## Course Objectives

Teach the architecture, programming, interfacing, and applications of microprocessors and microcontrollers.

## Course Learning Outcomes (CLO)

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| **CLO-1:** | Knowledge about the basic concept of microprocessors and microcontrollers | C2 |
| **CLO-2:** | An ability to understand different internal architectures and applications of Microprocessor/Microcontroller | C2 |
| **CLO-3:** | An ability to apply assembly language programming to analyze different blocks of the Microprocessor/Microcontroller | C3 |

## Course Contents

- A Historical Background, The Microprocessor-Based Personal Computer System, Number Systems, Computer Data Formats
- CPU, Memory Types, Bus Types, I/O Ports, ADC/DAC,
- Timer/Counter, Interrupt, Power Supply
- Internal Architecture, I/O Pins/Ports, Internal/External Memories and Registers, Instruction Sets, RISC Vs CISC
- Program Languages, Features of Assembly Language, Structure of Assembly Language, Registers & Memory with Simulator
- Loop & Jumps instructions, Conditional/Unconditional jumps Call instructions, Time delay for various 8051 chips
- 8051 I/O Programming, I/O bit manipulation programming
- Immediate and register addressing modes, accessing memory using various addressing modes, Bit addresses for I/O and RAM, Extra 128-byte on-chip RAM in 8052
- Arithmetic instructions, Signed number concepts and arithmetic operations, Logic and compare instructions, Rotate instruction and data serialization, BCD, ASCII and other application programs
- Pin description of the 8051, Design and test of DS89C4x0 trainer, Explaining the Intel hex file
- Programming 8051 timers, Counter Programming
- Basic serial communication, 8051 connection to RS232, 8051 serial port programming in Assembly, Programming the second serial port

## Mapping of CLOs to Assessment Modules

| CLOs/PLOs | CLO1 | CLO2 | CLO3 | |
|---|---|---|---|---|
| **PLO1: Engineering Knowledge** | √ | | | |
| **PLO2: Problem Analysis** | | √ | √ | |
| **PLO3: Design and Development of Solution** | | | | |
| **PLO4: Investigation** | | | | |
| **PLO5: Modern Tool Usage** | | | | |
| **PLO6: The Engineer and Society** | | | | |
| **PLO7: Environment and Sustainability** | | | | |
| **PLO8: Ethics** | | | | |
| **PLO9: Individual and Team Work** | | | | |

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| **PLO10: Communication** | | | | |
| **PLO11: Project Management** | | | | |
| **PLO12: Life Long Learning** | | | | |