North South University

Department of Electrical and Computer Engineering

Spring - 2024

CSE331/EEE332/EEE453/ETE332 (Microprocessor Interfacing and Embedded System)

**Instructor:** Dr. Sakhawat Hussain (SkH1)

**Office:** SAC 1045B

**Mobile:** +8801716865552

**E-mail:** sakhawat.hussain01@northsouth.edu

**Office Hours:** RA (Thursday-Saturday) 8.30 am – 9.15 am and 02.00 pm – 03.00 pm

**Credit Hours:** 3

**Class schedule**

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| --- | --- | --- | --- |
| Days | Time | Section | Location |
| RA (Thursday-Saturday) | 09.25 AM-10.40 AM | 5 | SAC 503 |
| RA (Thursday-Saturday) | 10.50 AM- 12.05 PM | 6 | NAC 992 |
| RA (Thursday-Saturday) | 12.15 PM -1.30 PM | 7 | SAC 513 |

**Course Description (Syllabus)**:

Fundamental concepts of Microprocessor, Internal and external architecture of 8086 microprocessor, Memory segmentation, flags, address modes, Instruction sets-data movement instructions, Arithmetic and Logic instructions, program control instructions, pins and signals, Basic I/O interfacing, memory interfacing: SRAM and EEPROM interfacing, Programmable peripheral interface (8255A), Interrupts, Interrupt driven I/O, Programmable Introduction to Assembly Language Programming. Introduction to microcontroller, Basic differences between a microprocessor and microcontroller. This course has mandatory laboratory session every week.

**Course Objectives:** Upon the completion of the course, the student should be able to

1. Basic understanding of the organization and design principle of 8086 microprocessor
2. General instruction sets of 8086 microprocessor and how to implement them
3. Interfacing mechanism of I/O devices with 8086 microprocessor
4. A complete understanding of Assembly Language Programming for microprocessor embedded system.
5. Basic idea about microcontroller.

**Textbook(s)**:

* Douglas V. Hall, Microprocessor and Interfacing, 3rd Edition, McGraw-Hill
* Barry B Brey, The intel Microprocessors, Architecture, Programming and Interfacing, Eight edition, 2009, Prentice Hall
* Ytha Yu and Charles Marut, Assembly Language Programming and Organization of the IBM PC, McGraw-Hill
* N. Mathivanan, Microprocessors PC Hardware and Interfacing, Prentice-Hall.
* MA Mazidi et al, PIC Microcontroller and Embedded Systems, Pearson
* I. Scott Mackenzie, The 8051 Microcontrollers Prentice-Hall.
* Ronald J. Tocci and Neal S. Widmer, Digital Systems Principles and Application, Prentice-Hall.

**Exams**: There will be one mid-term, one final exam and several quizzes

**Grading:**

* Attendance 10%
* Assignment 05%
* Lab work 15%
* Quizzes 20%
* Mid-term 20%
* Final Exam 30%

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| Obtained Marks | Grade |
| 85 and above | A |
| 80 to 84 | A - |
| 75 to 79 | B + |
| 70 to 74 | B |
| 65 to 69 | B - |
| 60 to 64 | C + |
| 55 to 59 | C |
| 50 to 54 | C - |
| 45 to 49 | D + |
| 40 to 44 | D |
| Below 40 | F |

**Lecture topics:**

1. Fundamental concept of Microprocessor

* Introduction of Microprocessors, Architecture and memory organization of 8086 microprocessor. Flags, general purpose registers and their uses.

1. Addressing modes

* Data addressing modes, Program addressing modes, stack addressing mode.

1. Instruction sets

* Data movement instructions: MOV, PUSH-POP, Load Effective Address, String Data transfer. Arithmetic and logic instructions: Addition, subtraction, comparison, Multiplication, Division. Shift and Rotation, Basic logic instruction. Program Control instructions.

1. Pins and signals

* 8086 pin configuration, Clock generator (8284A), Bus cycle, read and write cycle.

1. Assembly Language Programming

* Assembly Language Syntax, Program data, Variables, Named constant, Program structure, Input-output instructions, Creating and running a program.

1. Interfacing and Interrupts

* Basic I/O interfacing, Programmable peripheral interfacing (8255A), it’s mode of operation, Interrupt driven I/O, Software and hardware interrupts.

1. Microcontroller

* Basic about Microcontroller, Difference between a microcontroller and microprocessor.

**Attendance policy:**

As per university attendance policy, a student may be dropped from a course for absence in three consecutive classes. If a student needs to miss a class, they are advised to e-mail the instructor prior to the class. Students are requested not to enter the class after 10 minutes (Maximum) of the starting time. The attendance mark will be provided depending on students’ percentage of attendance.

**Make-up policy:**

A student who failed to attend any class is responsible for obtaining the knowledge of what happened in the class, especially information about announced tests, home-work/assignments. A student who is absent on the day of a previously announced examination/quizzes, including the mid-term and final examination is not entitled, as a matter of right, to make up what was missed.

**Exam rules:**

* Any attempt to cheat such as looking at other’s exam papers, copying from cheat sheet or other sources are strictly prohibited. If cheating of any form is caught, the exam will be cancelled straight away. No excuse will be accepted.
* Student must obey the standard rules of examination of the university.
* NO MAKE UP EXAMINATION will be arranged.

**General rules:**

* Use of cell phone in the class or lab is strictly prohibited. Phone must be in ‘silent’ mood during the class period.
* Extra class will be given if there is a need
* The teacher has the right to modify, add or remove topics in the mentioned topic list