**University of Management and Technology**

**Course Outline**

Course code: **EE 328** Course title: **Modern Microprocessor Systems**

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| Program | BSEE |
| Credit Hours | 3 |
| Duration | One Semester |
| Prerequisites | EE 227  Computer Organization and Architecture |
| Resource Person | Farah Sarwar1  Jamil Ahmed2 |
| Counseling Timing | Check on Website1,2 |
| Contact | [farah.sarwar@umt.edu.pk1](mailto:farah.sarwar@umt.edu.pk1)  [jamil.ahmed@umt.edu.pk](mailto:jamil.ahmed@umt.edu.pk) 2 |

**Chairman/Director signature………………………………….**

**Dean’s signature…………………………… Date………………………………………….**

**Learning Objective:**

The objectives of this course are to introduce students to development of microprocessor based programmable digital systems. Specifically architecture, interfacing and programming of Intel family of microprocessors are the main focus. Emphasis is put on evolution of IA-86 architecture as seen through 8008 to dual core processors. Topics related to memory & I/O interfacing, addressing modes, instruction set, microprocessor programming techniques, bus structure, DMA and interrupts are discussed. Recent research trends in modern multi-core microprocessors are also examined.

At the end of this course, students are expected to be able to:

* Identify distinguishing features of Intel family members ISA.
* Understand functions of modern memory & I/O systems and interface them to the microprocessors
* Develop software to interface Intel microprocessors with memory and IO.
* Analyze, design and implement practical systems of up to average complexity within a team.
* Appreciate design issues related to multi-core processor systems

**Learning Methodology:**

Lecture, Interactive, Participative

**Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

**Marks Evaluation Marks in percentage**

Quizzes & Assignments 15 %

Mid Term 25 %

Term Project 10%

Presentations

Final exam 50%

Total 100

**Recommended Text Books:**

**Text book:** "80X86 IBM PC and Compatible Computers: Assembly Language, Design, and Interfacing”, Volumes I & II (5th Edition) 2010, Pearson by Muhammad Ali Mazidi

**Reference Books:**

1) The Intel Microprocessors 8th Edition, By Barry B. Brey

2) Assembly Language Programming and Organization IBM PC, By Yatha Yu

**Calendar of Course contents to be covered during semester**

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| **Week** | **Course Contents** | **Reference Chapter(s)** |
| 1 | **Introduction to Computing**   * 1. Numbering and Coding Systems   2. Inside the Computer   3. Brief History of the CPU | Ch-0 |
| 2 | **The 80x86 Microprocessor**   * 1. Brief history of the 80x86 Microprocessor   2. Inside the 8086/8088   3. Introduction to Assembly Programming   4. Introduction to Program Segments   5. 80x86 Addressing Modes | Ch-1 |
| 3 | **Assembly Language Programming**   * 1. Directives and A sample Program   2. Control Transfer Functions   3. Data Types and Data Definition   **Arithmetic and Logic Instructions and Programs**  3.1 Unsigned Addition and Subtraction  3.2 Unsigned Multiplication and Division  3.3 Logic Instructions  3.5 Rotate Instructions | Ch-2  Ch-3 |
| 4 | **8088, 80286 Microprocessors and ISA Bus**  9.1 8088 Microprocessor  9.2 8284 and 8288 Supporting Chips  9.3 8-Bit Section of ISA Bus  9.4 80286 Microprocessor | Ch-9 |
| 5 | **Memory and Memory Interfacing**  10.1 Semiconductors Memory Fundamentals  10.2 Memory Address Decoding | Ch-10 |
| 6 | **Memory and Memory Interfacing**  10.3 IBM PC Memory Map  10.5 16-bit Memory Interfacing | Ch-10 |
| 7 | **IO and the 8255; ISA Bus Interfacing**  11.1 8088 I/O Instructions  11.2 I/O Address decoding and Design  11.3 I/O Address map of x86 PCs | Ch-11 |
| 8 | **Mid Term Examination** |  |
| 9 | **Interfacing to the PC: LCD, Motor, ADC and Sensor**  12.1 Interfacing an LCD to a PC  12.2 Interfacing a Stepper Motor to a PC   * 1. Interfacing ADC, DAC and Sensor to a PC   **8253/54 Timer and Music**  13.1 8253/54 Timer Description and Initialization  13.2 IBM PC 8253/54 Timer Connections and Programming | Ch-12  Ch-13 |

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| 10 | **Interrupts and 8259 Chip**  14.1 8088/8086 Interrupts  14.2 Assignment of Interrupts  14.3 8259 Programmable Interrupt Controller | Ch-14 |
| 11 | **Direct Memory Access**  15.1 Concept of DMA  15.2 8237 DMA Chip Programming  15.3 8237 DMA interfacing in the IBM PC | Ch-15 |
| 12 | **Serial Data Communication**  17.1 Basics of Serial Communication  17.2 Accessing COM Ports of IBM PC | Ch-17 |
| 13 | **High Speed Memory Interfacing and Cache**  22.1 Memory Cycle Time  22.2 Page, Static, Column and Nibble Mode DRAMs  22.3 Cache Memory  22.4 EDO, SDRAM and Rambus Memories | Ch-22 |
| 14 | **486, Pentium, Pentium Pro and MMX**  23.1 The 80486 Microprocessor  23.2 Intel`s Pentium  23.3 RISC Architecture  23.4 Pentium Pro Processor  23.5 MMX Technology | Ch-23 |
| 15 | **The evolution of x86: From 32-bit to 64-bit**  24.1 Variations and Enhancements of 32-bit processors  24.2 64-bit Architecture of x86 | Ch-24 |
| 16 | **Final Term Examination** |  |