



Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-220	Microprocessors	6
Prerequisites	Department	Semester
ECE-110	Engineering	Spring
Type of Course	Field	Language of Instruction
Required	Engineering	English
Level of Course	Lecturer(s)	Year of Study
1 st Cycle	Andreas Serghiou	2 nd
Mode of Delivery	Work Placement	Corequisites
Face-to-face	N/A	ECE-212

Course Objectives:

The main objectives of the course are to:

- Provide the student with a thorough grounding in Microprocessor programming and operation principles and demonstrate the merging of software and hardware concepts into firmware in microprocessor-based systems.
- Introduce the 16/32-bit microprocessor as a component for an electronic system in general and not only as the basis of a personal computer.
- Provide the student with the fundamental knowledge on how to develop software using assembly language programming to control an application interface microprocessor.
- Develop a thorough understanding of how DOS and BIOS function calls can be used to control the keyboard, display, and various other components in the computer system.
- Compare and contrast instructions, for the 80286, 80386, 80486, Pentium, Pentium Pro and Core 2 processors with the 8086/8088 microprocessors.

Learning Outcomes:

After completion of the course students are expected to be able to:

- Explain the hardware architecture of 8088/86 microprocessors and treat these microprocessors as a component for an electronic system rather than as the basis of a personal computer.
- Demonstrate knowledge and understanding of real mode (DOS) and protected mode (Windows) of the Microprocessor.

- Explain how each assembly language instruction functions with the Intel family of microprocessors.
- Develop software using 16/32 bit assembly language to program a microprocessor.
- Use DOS and BIOS function calls to control the keyboard, display, and various other components in the computer system.
- Identify and analyze basic hardware differences, and compare and contrast instructions, for the 80286, 80386, 80486, Pentium, and Pentium Pro and Core 2 processors with the 8086/8088 microprocessors.

Course Content:

- Introduction to microprocessor internal organization, Execution Unit, Bus Interface Unit, ROM, RAM, I/O Ports, Interrupts, Direct Memory Access, Internal and External Busses.
- Function and purpose of each program-visible/invisible register in the 8086-Core 2 microprocessors, real mode vs. protected mode memory addressing techniques, contents of the memory system of a pc, memory paging.
- 8086/8088 hardware specifications, pin-outs and the pin functions, Minimum vs. Maximum mode, internal organization of the 8284 clock generator and 8288 bus controller.
- Bus buffering and latching, bus timing, Wait-state generation circuitry, READ and WRITE cycle time calculations, Memory Bus Bandwidth for 80x86 computers.
- Data addressing modes, register addressing, immediate addressing, direct data addressing, base-plus-index addressing, register relative addressing, base-relative-plus index addressing, scaled-index addressing, program memory-addressing modes, stack memory addressing.
- Machine language, PUSH-POP, load effective address, string data transfers, data transfer instructions, assembler directives.
- Arithmetic instructions, comparison, basic logic operations, shifts and rotates, string comparisons.
- Program control instructions, relational assembly language statements, purpose of interrupts, interrupt control instructions.
- Programming using DOS and BIOS function calls, programming examples.

Learning Activities and Teaching Methods:

Lectures, in-class design and program examples.

Assessment Methods:

Homework, mid-term exam, final exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
The Intel Microprocessors	Barry B. Brey	Prentice Hall	2009	0137140940

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
The 80x86 IBM PC and Compatible Computers (Volumes I & II)	Muhammed A. Mazidi, Janice G. Mazidi	Prentice Hall	2003	0130165689
The 8088 and 8086 Microprocessors	Walter A. Triebel, Avtar Singh	Prentice Hall	2002	0130930814