Electrical Engineering Department
King Fahd University of Petroleum & Minerals

Course Number: EE 390
Course Title: Digital System Engineering (Required Course)

Course Description :

8088/8086 Microprocessor hardware and software Models. Instruction sets. Assembly language programming and debugging. Memory and input/output mapping. Input and output instructions. Input/output Interfacing. Introduction to interrupts and basic microcontrollers.

Prerequisites :

COE 202 and COE 203

Textbook :

Digital System Engineering, 4th Edition, Prentice Hall, 2003, Prentice Hall, ISBN 0-13-093081-4

Other useful references and material :

- Y. Liu and G. A. Gibson, Microcomputer Systems: The 8086/8088 Family. Prentice Hall.
- John Uffenbeck, The 80x86 Family Design, Programming and Interfacing. Prentice Hall.

Website: https://webcourses.kfupm.edu.sa/ or http://ocw.kfupm.edu.sa/

Course objectives:

After successfully completing the course, the students will be able to
- Develop an understanding of basic computer organization
- Provide comprehensive understanding of software and hardware models of 8086 and 8088 microprocessors
- Introduce Assembly language programming
- Introduce basics, programming and application of Microcontrollers (8051)
- Train engineers how to practice and apply their electrical engineering knowledge in a professional, ethical and safe manner.

Topics Covered :

- 8086/8088 Microprocessor internal architecture
- Software model and memory organization.

- Addressing modes
- Program Debugging tools (DEBUG and Turbo-DEBUG)
- Assembly Language instruction set of 8086/8088
- Assemblers (TASM or MASM)
- Assembly Language Directives
- 8086 and 8088 hardware architecture
- Memory Interface circuits
- Memory Devices
- Input/output interface circuits
- Introduction to Interrupts
- Microcontrollers basics

Class/Laboratory Schedule :.

3 lectures per week (50 minutes each) and 3 hours lab per week.

Contribution of course to Meeting the professional component :

The students will learn software and hardware models of basic 80x86 microprocessors and how to program them using assembly language. The course will emphasize on the use of professional emulators and software's, such as, debugging tools (DEBUG or TD) and assemblers (TASM or MASM). Laboratory classes are designed to promote and strengthen the knowledge acquired in this course. The course project is intended to test the innovativeness and competency in programming and interfacing techniques.

Course Outcomes:

- Ability to use software development tools to assemble, test and debug the programs by using breakpoints, single-stepping, monitoring the changes in register/memory contents, on a hardware platform or on an emulator.
- Ability to apply assembly directives to initialize memory for global variables and use assembly language to implement flow control (sequential, conditional and iterative)
- Understand how the 8086 and 8088 microprocessors identify different sources of interrupts and exceptions, and invokes the corresponding handler to deal with the interrupt and exception.
- Ability to write assembly language programs to read and write the registers in an I/O adapter that control the communication with I/O devices.
- Ability to program basic microcontroller based digital circuits.

Prepared by Dr. Sheikh Sharif Iqbal, January, 2008.