

KING FAHD UNIVERSITY OF PETROLEUM & MINERALS  
COLLEGE OF COMPUTER SCIENCES & ENGINEERING  
**COMPUTER ENGINEERING DEPARTMENT**  
**COE 205 Computer Organization & Assembly Language**

**Syllabus - Term 041**

**Catalog Description:**

Introduction to computer organization. Octal and Hexadecimal number systems, ASCII codes. Assembly language programming, instruction format and types, memory and I/O instructions, arithmetic instructions, addressing modes, stack operations, and interrupts. ALU and control unit design. RTL, microprogramming, and hardwired control. Practice of assembly language programming.

*Prerequisites:* COE 200 and ICS 201

**Instructor:** Kamal Chenaoua. Room: 23/082 Phone: 2082  
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URL: <http://www.ccse.kfupm.edu.sa/~kamel/>

**Course URL:** <http://196.1.65.105/>  
<http://assembly.pc.ccse.kfupm.edu.sa>

**Office Hours:** SMW 11:00-12:00 (or by appointment)

**Text Books & References:**

- Sivarama P. Dandamudi, et al., “*Introduction to Assembly Language Programming: From 8086 to Pentium Processors*”, Springer Verlag, 1998. (ISBN: 0387985301).
- Vincent Heuring, Harry F. Jordan, Miles Murdocca, “*Computer Systems Design and Architecture*”, Addison Wesley 1997. (ISBN 0-8053-4330-X).
- Ytha Yu and Charles Marut, “*Assembly Language Programming and Organization of the IBM PC*”, McGraw Hill, 1992. (ISBN: 0-07-072692-2).
- Additional notes will be given when needed.

**Grading Policy:**

Item	Weight	Exam Tentative Dates
Laboratory	20 %	
Programming Assignments	5 %	
Quizzes + HWs	15 %	
Major Exam I	20 %	October 14 <sup>th</sup> , 2004
Major Exam II	20 %	December 16 <sup>th</sup> , 2004
Final Exam	25 %	

- Assignments are to be submitted in class in the specified due date.
- Late assignments will be accepted but will be penalized 5 % per each late day.

## **Course Content:**

### **Part I: Assembly Language Programming**

#### ***1. Introduction to Computer Organization and Information Representation. (6 lectures)***

- Introduction to computer organization. Instruction Set Architecture.
- Computer Components.
- Fetch-Execute cycle.
- Signed number representation: Ranges, Overflow.

#### ***2. Assembly Language Concepts. (6 lectures)***

- Assembly language format.
- Directives vs. instructions.
- Variable declaration: Constants and variables.
- Input Output: INT 21H.
- Addressing modes.

#### ***3. 8086 Assembly Language Programming. (17 lectures)***

- Register Set.
- Memory Segmentation.
- Data Transfer Instructions: MOV instructions.
- Arithmetic instructions and flags: (ADD, ADC, SUB, SBB, INC, DEC, MUL, IMUL, DIV, IDIV).
- Compare, Jump and Loop Instructions (CMP, JMP, Conditional jumps, LOOP).
- Logic, Shift and Rotate.
- Stack operations: (PUSH, POP)
- Subprograms. Macros.
- String instructions: (MOVS, CMPS, SCAS)
- Interrupts and interrupt processing: INT and IRET.
- Input Output (IN, OUT).

### **Part II: Computer Organization**

#### ***4. Memory System Design. (4 lectures)***

- Main memory, SRAM, DRAM.
- External memory, magnetic and optical disks.
- Bus system.

#### ***5. CPU Design. (12 lectures)***

- Register transfer.
- Data-path design: 1-bus, 2-bus and 3-bus CPU organization.
- Fetch and execute phases of instruction processing. Performance consideration.
- Control steps.
- CPU-Memory Interface circuit.
- Hardwired control unit design.
- Microprogramming. Horizontal and Vertical microprogramming.
- Microprogrammed control unit design.