KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
COLLEGE OF COMPUTER SCIENCES & ENGINEERING

COMPUTER ENGINEERING DEPARTMENT

COE 205 Computer Organization & Assembly Language
Syllabus - Term 043

Catalog Description

Introduction to computer organization. Signed and unsigned number representation, character representation, ASCII codes. Assembly language programming, instruction format and types, memory and I/O instructions, dataflow, arithmetic, and flow control instructions, addressing modes, stack operations, and interrupts. Datapath and control unit design. RTL, microprogramming, and hardwired control. Practice of assembly language programming.
Prerequisite: COE 200 and ICS 201

Instructor Dr. Aiman H. El-Maleh. Room: 22/318 Phone: 2811
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Office Hours SUMTW 11:30-12:30 PM (and by appointment)

Course Learning Outcomes

1. Knowledge of basic computer organization, information representation, and basic assembly language concepts.
2. Ability to analyze, design, implement, and test assembly language programs.
3. Ability to use tools and skills in analyzing and debugging assembly language programs.
4. Ability to design the datapath and control unit of a simple CPU.
5. Ability to demonstrate self-learning capability.
6. Ability to work in a team.

Text Books & References:

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

Grading Policy

Laboratory	20%
Programming Assignments	15%
Quizzes	10%
Exam I	15%
Exam II	20%
Final	20%

- Assignments are to be submitted in class in the specified due date.
- Late assignments will be accepted but will be penalized 10% per each late day.

Course Topics

1. ***Introduction 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. Constants and variables. I/O. INT 21H. Addressing modes.
3. ***8086 Assembly Language Programming.*** **20 lectures**
   Register set. Memory segmentation. MOV instructions. Arithmetic instructions and flags (ADD, ADC, SUB, SBB, INC, DEC, MUL, IMUL, DIV, IDIV). Compare, Jump and loop (CMP, JMP, Cond. jumps, LOOP). Logic, shift and rotate. Stack operations. Subprograms. Macros. I/O (IN, OUT). String instructions. Interrupts and interrupt processing, INT and IRET.
4. ***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.
5. ***Instruction Set Formats.*** **1 lecture**
   Fixed vs. variable instruction format. Examples of instruction formats.