**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
Email: kamel@ccse.kfupm.edu.sa

**Course URL:**
- [http://196.1.65.105/](http://196.1.65.105/)
- [http://assembly.pc.ccse.kfupm.edu.sa](http://assembly.pc.ccse.kfupm.edu.sa)

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

**Text Books & References:**
- Additional notes will be given when needed.

**Grading Policy:**

<table>
<thead>
<tr>
<th>Item</th>
<th>Weight</th>
<th>Exam Tentative Dates</th>
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</thead>
<tbody>
<tr>
<td>Laboratory</td>
<td>20 %</td>
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<tr>
<td>Programming Assignments</td>
<td>5 %</td>
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<tr>
<td>Quizzes + HWs</td>
<td>15 %</td>
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<tr>
<td>Major Exam I</td>
<td>20 %</td>
<td>October 14(^{\text{th}}), 2004</td>
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<tr>
<td>Major Exam II</td>
<td>20 %</td>
<td>December 16(^{\text{th}}), 2004</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25 %</td>
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• 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.