

**1. Course number and name**

COE 341 – Computer Architecture and Organization

**2. Credits and contact hours**

3 credit hours, 3 contact hours

**3. Prerequisites or co-requisites**

Prerequisites: COE 241 (Microcontrollers: Programming and Interfacing) for COE students; or COE 251 (Introduction to Computer Systems) for CMP students.

**4. Name and Contact Information of Instructor**

Dr. Hicham H. Hallal

**5. Course Description (Catalog Description)**

Covers CPU organization and microarchitectural level design; RISC design principles; memory, peripheral devices and input/output busses; DSP processor architectures; and introduction to parallel computing.

**6. Textbook, title, author, and year**

Tanenbaum A., Structured Computer Organization, 6th edition, Pearson, 2012

or

Stallings W., Computer Organization and Architecture, 10th edition, Prentice Hall, 2016.

**Supplemental material**

- *L. Null and J. Lobur, The Essentials of Computer Organization and Architecture, 3rd edition, Jones Bartlett Learning, 2010.*
- *Handouts and Lecture notes through iLearn.*

**7. Specific goals for the course**

Upon completing the course, student will be able to:

1. Explain the overall organization of modern computer system and recall its components
2. Explain the basic organization in the memory hierarchy (Ram and Cache), and estimate the associated design tradeoffs.
3. Outline the operation of fixed- and floating-point arithmetic in the ALU.
4. Analyze an instruction-set architecture, and design a suitable datapath and control unit implementation.
5. Write correct assembly programs to execute specific functions (arithmetic, logic, shifting)
6. Analyze the effect of instruction pipelining on processor performance
7. Explain the I/O systems and the outline the operation of buses
8. Explain the basics of architectures supporting parallelism with the presence of multiprocessors and DSP processors.

**8. Teaching and Learning Methodologies**

Methods include lectures, labs, homework assignments, quizzes and project, exams and class discussions

**9. Course Topics and Schedule:**

<b>Topic</b>	<b>Weeks</b>
Introduction to basic building blocks in computer system: a. Von Neumann and Harvard architectures b. RISC, and CISC	2
Computer Arithmetic: fixed- and floating point; ALU Design; Datapath design	2
Memory Systems: Memory Mapping; Caches; External Memory; DMA	2
Instruction set design; Addressing Modes	2
Control unit design; hardwired and microprogrammed control	2
Introduction to Instruction Pipelining	2
I/O system; system busses	1
Introduction to Parallel Processing, Multiprocessor/ DSP Processors	2
Review and assessment	1
Total	16