Course Title and Code	COE223 – Computer Organization

I. Course Identification and General Information:

Course Title	Computer Organization	Course Code	COE223	Pre-requisite	COE121
Department	Computer Engineering	Course Level	5	Credit Hours	3 (3+0)

II. Course Description/Topics: The following course topics will be covered.

- History and overview.
- Fundamentals of computer architecture.
- Computer arithmetic (adders, subtractors, comparators, multiplication, division, ALU's).
- Number systems (fixed & floating point).
- Sequential Building Blocks (counter, shift register); Memory Arrays (RAMs, ROMs); Logic Arrays (PLAs, FPGAs).
- MIPS Instruction Set and Registers; Branches & Procedure Calls, Addressing Modes; Linking & Launching Applications.
- Single-Cycle Processor Data-path; Single-Cycle Processor Control.
- The CPU interface: clock, control, data and address buses.
- Address decoding and memory interfacing
- Main memory organization and its characteristics and performance.
- Cache memories (address mapping, line size, replacement and write-back policies).
- Virtual memory systems.
- Memory-mapped I/O; Memory system performance & hierarchy: Caches; Memory system optimization; Virtual Memory.

III. Course Outcomes: Summary of the main learning outcomes for students enrolled in the course.

- Identify some of the components of a computer.
- Describe how computer engineering uses or benefits from computer architecture.
- Explain how a computer fetches from memory and executes an instruction.
- Explain the relationship between the representation of machine level operation at the binary level and their representation by a symbolic assembler.
- Explain why a designer adopted a given different instruction formats, such as the number of addresses per instruction and variable length vs. fixed length formats.
- Write small programs and fragments of assembly language code to demonstrate an understanding of machine level operations.
- Implement some fundamental high-level programming constructs at the machine-language level.
- Appreciate the effect of a processor's arithmetic unit on its overall performance.
- Identify the main types of memory technology.
- Understand how a CPU chip becomes a complete system.

IV. Required Text:

- Harris, D. and Harris, S., "Digital Design and Computer Architecture", (2nd Edition), Morgan Kaufmann, August, 2012, ISBN: 0123944244.

V. References:

- M. Morris Mano, "Computer System Architecture", (3rd Edition).