

**Course Title: Computer Organization and Architecture**

**Course Code: COMP 201**

**Credit Hours: 3**

**Course Description:**

This course provides the general principles of computer organization and aspects of design logic, including the following topics: Von Neumann machine, CP and AL design, instruction set formats, addressing modes, memory systems and subsystems, I/O devices and operations.

**Course Contents:**

**Unit 1: Basic Structures**

Sequential circuits, design procedure, state table and state diagram Von Neumann architecture, stored program concepts and functional units

**Unit 2: Addressing Methods and Programs**

Programming view of a processor, data types, and representation of data, arithmetic operations, basic operational concepts, bus structures, instruction cycle and excitation cycle

**Unit 3: Processing Unit**

Instruction formats: computer instruction, instruction length, address instruction, arithmetic instruction, and logical instruction.

**Unit 4: Addressing Modes**

General concepts, single component addressing modes, multi-component addressing modes, and position independent code

**Unit 5: Input Output Organization**

Basic principles of interrupt driven I/O and DMA, I/O operations, I/O programming, memory mapped I/O, basic interrupt system, direct memory access, DMA channel programming, and memory mapped screens.

**Unit 6: Arithmetic**

Magnitude comparator, complements, straight subtraction, subtraction with components, addition and subtraction algorithms, hardware implementation, multiplication and division algorithms, hardware implementation, and divide overflow

**Unit 7: Memory System**

Auxiliary memory: magnetic drum, magnetic disks, and magnetic tapes; microcomputer.

**Unit 8: Memory**

RAM/ROM chips, memory address map, memory connection to microprocessor; memory hierarchy; associative memory: hardware organization, Match logic, read operation, write operation; virtual memory: address space memory space, address mapping, associative memory page table; cache memory: associative mapping, direct mapping, set associative mapping; memory management hardware

**References:**

1. M. Morris Mano, *Computer System Architecture*, Prentice Hall Inc.
2. William Stallings, *Computer Organization & Architecture* , 4th Ed, Prentice Hall Inc.