

Department Of Computer Science and Engineering
Kathmandu University
Dhulikhel, Kavre



Subject: Computer Architecture and Organization
315

Course: COMP

Level: B.E./B.Sc 3rd Year 1st Semester

Credit Hours: 3

Course Objective:

To extend and refine the elementary concepts of computer architecture introduced in the first year computer foundation and second year first semester digital logic courses. This course will lay the foundation for the microprocessors course. No practical for this course but a case-study and paper based design of CPU (MPU) will help out to understand the internal architecture of a computer system.

Prerequisites:

Students should have good knowledge about digital logic and basic working principle of computer hardware (Computer Foundation).

Contents:

1. **Basic Structures:** Sequential circuits, design procedure, state table and state diagram Von Neumann architecture, stored program concepts and functional units. [3 hrs]
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. [8 hrs]
3. **Processing Unit:** Instruction formats: computer instruction, instruction length, address instruction, arithmetic instruction, and logical instruction. [6 hrs]
4. **Addressing modes:** General concepts, single component addressing modes, multi-component addressing modes, and position independent code. [6 hrs]
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. [6 hrs]
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 [6 hrs]

7. **Memory System:** Auxiliary memory: magnetic drum, magnetic disks, and magnetic tapes; microcomputer. [4 hrs]
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 [6 hrs]

TEXT BOOKS:

1. Computer System Architecture (3rd ed.), Prentice-Hall, Inc. Upper Saddle River, NJ, USA ©1993, ISBN:0-13-175563-3
2. Computer Organization and Architecture (4th ed.): Designing for performance, Prentice-Hall, Inc. Upper Saddle River, NJ, USA ©1996, ISBN:0-13-359985-X