

Name of the Programme: MSc Integrated

Course Code: IMC- 501

Title of the Course: Computer Organization & Operating Systems

Number of Credits: 6(4L-0T-2P)

Contact Hours: 96hours (48L-0T-48P)

Effective from AY: 2022-23

Prerequisites for the course:	Nil	
Objective:	The aim of the course is to provide students the theoretical and conceptual knowledge of Computer System Architecture and Operating systems.	
Content Theory:	Introduction to digital electronics: Logic gates, boolean algebra, combinational circuits	2 hours
	Data Representation and Basic Computer Arithmetic: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction	2 hours
	Basic Computer Organization and Design: Computer registers, instruction set, instruction cycle, input-output and interrupt, Bus Interconnection design of basic computer.	4 hours
	Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control. Instruction formats, addressing modes.	4 hours
	Memory and Input-Output Organization: Cache memory, Associative memory, and mapping, Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access.	3 hours
	Introduction to Operating Systems Basic OS functions, resource abstraction, types of operating systems.	3 hours
	Operating System Organization: Processor and user modes, kernels, system calls and system programs.	4 hours
	Process Management: System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-pre-emptive and preemptive scheduling algorithms; Concurrent processes, critical section, semaphores, methods for inter-process communication; deadlocks.	12 hours
	Memory Management: Physical and virtual address space; memory allocation strategies -fixed and variable partitions, paging, segmentation, virtual memory	6 hours
	File and I/O Management: Directory structure, file operations, files allocation methods, device management.	5 hours
	Protection and Security: Policy mechanism, Authentication, Internal access Authorization.	3 hours

Content Practical:	Suggested Lab Assignments with each assignment with duration of 4 hrs <ol style="list-style-type: none"> 1. Sample assignment for introduction to the environment of the UNIX program. 2. Sample assignment for introduction to vi editor. 3. Assignment for use of paths: absolute, relative and search. 4. Assignment for use of unix file commands. 5. Assignment for use of unix directory commands. 6. Assignment for use of simple filters: who, sorts, tail, head, etc. 	12 * 4 = 48 hours
	<ol style="list-style-type: none"> 7. Introduction to Command substitution : foreground and background processors. 8. Assignment for use of process management commands. 9. Assignment for use of redirection commands. 10. Assignment for use of wildcards and regular expressions. 11. Assignment for use of complex commands: pipelining commands. 12. Assignment for use of advanced filters: grep, sed, tr and awk. 	
Pedagogy:	Lectures/tutorials/assignments/class presentations and debates/peer reviews / workshops /self-study	
References/ Readings	<ol style="list-style-type: none"> 1. M. Mano, Computer System Architecture, Pearson Education 1992 2. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India,2009 3. M.M. Mano , Digital Design, Pearson Education Asia,2013 4. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008. 5. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007. 6. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997. 7. W. Stallings, Operating Systems, Internals & Design Principles, 5th Edition, Prentice Hall of India. 2008. 8. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992. 	
Course Outcomes	<ol style="list-style-type: none"> 1. Understand computer organization and architecture, including data representation, computer arithmetic, CPU organization, memory, and I/O. 2. Explore operating system design and services, including process synchronization and scheduling, memory management, and file system organization. 3. Learn about the structure and organization of the file system, including system calls for managing processes, memory, and file operations. 4. Gain knowledge of system-level components, such as CPU, registers, memory, I/O, and their integration within an operating system for efficient and reliable computing. 	