Name of the Programme: MCA
Course Code: CSA-502
Title of the Course: Operating System
Number of Credits: 3 (3L-0T-0P)
Effective from AY: 2022-23

Prerequisites for the course	Computer Architecture Basics	
Objectives	This course focuses on the principles and understanding of the functionality of an operating system and evaluates their trade-off in various environments.	
Content	**Introduction and Systems Structures** Computing Environments, Operating-systems Services, System Calls, System Programs, Virtual Machines, monolithic and micro kernel architectures	3 hours
	Process Management Process - Concept and states, Process Creation and Control, Scheduling Criteria, Scheduling Algorithms, MultiLevel Queues, Multiple-processor scheduling, Real time CPU scheduling	5 hours
	Threads Motivation and Challenges, Multithreading Models, Threading Issues, Thread libraries, Thread scheduling	5 hours
	Process Synchronization Cooperating processes and Race Conditions, The critical-section problem, Peterson's solution, mutex locks, Synchronization Hardware, Semaphores and their Implementation, Classic problems of synchronization	5 hours
	Inter process Communication, Overview of IPC, Examples of IPC Systems, Communication in Client Server Systems.	3 hours
	Deadlocks System Model, Deadlock characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery From Deadlock	5 hours
	Memory Management Hardware Support, Address Binding, Swapping , Contiguous Memory Allocation, Fragmentation, Memory Protection, Paging, Structure of the page table, Segmentation, Example: Intel architecture	5 hours
	Virtual-Memory Management Background, Demand Paging, Copy-on-write, Page Replacement algorithms, Allocation of Frames, Thrashing, Allocating Kernel Memory	5 hours
	File System File Concept, Access Methods, Directory Structure, File-system mounting, File sharing, Protection. Virtual file systems, Implementing File Systems, Directory implementation, Allocation Methods, Free-space Management, Efficiency and performance, Recovery, Log-structured file systems	5 hours
	Secondary-storage Structure Overview of Mass-storage Structure, Disk Structure, Disk Attachment, Disk Scheduling, Disk Management, Swap-Space Management	4 hours
Pedagogy	lectures/ tutorials/assignments/class presentations and debates/peer reviews/self-study.	
References/	**Main Reading**	

Readings	1. Silberschatz ,Galvin and Gagne , Operating systems Principles – 8th edition or Later(Wiley Asia Student Edition) 2. Deitel H.M., "An Introduction to Operating Systems", Addison Wesley Publishers Company, Latest Edition 3. Milenkovic M., "Operating Systems : Concepts and Design", McGraw Hill International Edition Computer Science series ; Latest Edition 4. Tanenbaum A. S., Modern Operating Systems", Prentice Hall of India Pvt. Ltd.,Latest Edition 5. Operating Systems – a modern perspective - Gary Nutt , Addison Wesley, Latest Edition	
Course Outcomes	1. To understand the services provided by and the design of an operating system. 2. To understand the structure and organization of the file system. 3. To understand what a process is and how processes are synchronized and scheduled. 4. To understand different approaches to memory management. 5. Students should be able to understand the implementation and use of system calls for managing processes, memory and the file system. 6. Students should understand the data structures and algorithms used to implement an OS. 7. Evaluate operating system implementations	

(Back to top)