Course code	Course Title	L	T	P	C
BITE303L	Operating Systems	3	0	0	3
Pre-requisite	BITE201L, BITE201P	Syllabus version			
		1.0			

Course Objectives:

1. To understand the Computer System Structure and Operating Systems Structure
2. To learn manage multiple tasks that execute at the same time and share resources.
3. To have a basic understanding on memory management, I/O devices and operations on files extensively.

Course Outcomes:

1. Knowledge on Operating systems and its different subsystems in controlling computer hardware.
2. Apply principles of process management, CPU scheduling and deadlocks.
3. Design the process synchronization and Inter Process Communication.
4. Develop memory management schemes.
5. Design and manipulate file system.

Module:1	Elementary concepts	6 hours

Introduction to Operating Systems - Operating System Operations - Operating System Services- User and Operating System Interface - System Calls- System Services- Operating System Design and Implementation- Operating System Structure- Building and Booting an Operating System

Module:2	Processes and Threads Management	6 hours

Process Concept – Process Scheduling – Operations on Processes – Inter-process Communication – IPC in Shared - Memory Systems – IPC in Message - Passing Systems – Threads - Multicore Programming - Multithreading Models -Thread Libraries - Implicit Threading - Threading Issues - Case Study: IPC System in Windows, Linux & Mac OS

Module:3	CPU Scheduling and Deadlocks	7 hours

Scheduling Criteria - Scheduling Algorithms – Multiple Processor Scheduling – Real Time CPU Scheduling – Deadlocks - Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery from Deadlock

Module:4	Process Synchronization	6 hours

The Critical Section Problem - Peterson's Solution – Hardware Support for Synchronization – Mutex Locks – Semaphores – Monitors – Classic Problems of Synchronization - Synchronization within the Kernel - POSIX Synchronization

Module:5	Memory Management	6 hours

Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation – Paging with segmentation - Demand Paging – Page Replacement – Allocation of Frames – Thrashing - Memory Compression - Allocating Kernel Memory - Case Study: VM implementation in Windows & Solaris

Module:6	Storage Management	6 hours

Mass Storage Structure - Disk Scheduling - Error Detection and Correction – Storage Device Management – Swap Space Management - I/O Systems - I/O Hardware - Application I/O Interface - Kernel I/O Subsystem

Module:7	File System	6 hours

File Concept – Access Methods – Directory Structure – Protection – Memory Mapped Files – File System Structure - File System Operations - Directory Implementation – Allocation

Methods – Free Space Management - Efficiency and Performance - Recovery - Case Study: NTFS, EXT4 & APFS		
Module:8	**Contemporary Issues**	**2 hours**
	Total Lecture hours:	**45 hours**

Text Book	
1.	Abraham Silberschatz, Greg Gagne and Peter B. Galvin, "Operating System Concepts",2018, 10th Edition, Wiley.
Reference Books	
1.	William Stallings, "Operating Systems – Internals and Design Principles", 2018, 9th Edition, Pearson Education .
2.	D. M. Dhamdhere, "Operating Systems: A Concept-Based Approach", 2017, 3rd Edition, Tata McGraw-Hill.
3.	Maurice J. Bach, "The Design of the Unix Operating System", 2015, Pearson Education India.

Mode of Evaluation: Continuous Assessment Tests, Assignment, Quiz, Final Assessment Test			
Recommended by Board of Studies	20-05-2022		
Approved by Academic Council	No. 66	Date	16-06-2022