NIRMA UNIVERSITY

Institute:	Institute of Technology, School of Technology
Name of Programme:	BTech CSE, Integrated BTech (CSE)-MBA, BTech AI&ML
Course Code:	2CS506CC25
Course Title:	Operating Systems
Course Type:	Core
Year of Introduction:	2025-26

L	T	Practical Component				C
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Course Learning Outcomes (CLO):

At the end of the course, the students will be able to –

1. explain the services and functionalities of operating systems (BL2)
2. apply the concepts of processes and memory management for problem-solving (BL3)
3. make use of shell scripts to demonstrate various concepts of operating systems. (BL3)
4. appraise the mechanisms of operating systems to handle I/O devices and file management. (BL4)

Unit	Contents	Teaching Hours (Total 30)
Unit-I	**Introduction to Operating System:** Operating system services, Operating system objectives and functions, types of operating system, various ways to handle the I/O operations, system calls	03
Unit-II	**Process Management:** Process states, process description, process control, process control block, scheduling algorithms, performance evaluation of the algorithms	06
Unit-III	**Interprocess Communication:** Race condition, mutual exclusion, inter-process communication, semaphore, mutexes, monitor, classical IPC problems, threads **Deadlock:** Introduction to deadlock, resource allocation graph, deadlock prevention, deadlock avoidance, deadlock, detection and recovery from the deadlock	10
Unit-IV	**Memory Management:** Memory management requirements, partitioning, paging, virtual memory, and segmentation	08
Unit-V	**I/O Management and Files:** disk scheduling, RAID, file management	03

Self-Study:

The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study content.

Suggested Readings/ References:

1. A. S. Tannenbaum, Modern Operating Systems, McGraw Hill
2. William Stallings, Operating Systems, Prentice Hall India
3. Silberschiltz, Galvin and Greg Gange, Operating System, Willey
4. Peterson, Operating System Concepts, Addition-Wesley
5. Milan Milenkovic, Operating System Design & Concepts, McGraw Hill.
6. Sumitabha Das, UNIX: Concepts and Applications, McGraw Hill
7. Yashwant Kanetkar, UNIX Shell Programming, BPB.

Suggested List of Experiments:

Sr. No.	Name of Experiments/Exercises	Hours
1	a) Getting acquainted with basic UNIX commands b) Getting acquainted with UNIX filters	04
2	Write a shell script for performing the functions of a basic calculator. (Using decision-making, case-control structure, and bc command)	02
3	a) Write a shell script to compare the contents of two files. b) Write a shell script to generate all the combinations of 1, 2 and 3	02
4	(a)Write a shell script to keep on accepting lines of text and write the text into a data file until the user inputs "end". The script should count the number of lines input and display them. (b) Write a shell script that receives two filenames as arguments compare two files, and deletes the second file if both files are the same	02
5	Write a shell script that imitates head and tail commands (without using head and tail commands)	02
6	a) Write a shell script to delete all the lines containing the word entered by the user in the files supplied as arguments to this shell script. b) Write a shell script to concatenate all given files into a single file	02
7	Write a shell script for implementing directory management	04
8	Write a shell script for performing basic functions related to information retrieval	04
9	Write a C program to implement a system call using the fork () and Exec () functions	04
10	Write a C program to implement the grep command.	04