CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF TECHNOLOGY&ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CS350: OPERATING SYSTEM

Credits and Hours:

Teaching Scheme	Theory	Practical	Tutorial	Total	Credit
Hours/week	3	2	-	5	4
Marks	100	50	-	150	

Pre-requisite courses:

- Introduction to computer and computer architecture.

Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction	02
2.	Process Management	04
3.	Inter process Communication	08
4.	Deadlock	06
5.	Memory Management	08
6.	Input Output Management	07
7.	File Systems	06
8.	Unix/Linux File System	04

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

Detailed Syllabus:

1.	**Introduction**	**02 Hours**	**05%**
1.1	What is an OS? Evolution of OS		
1.2	OS Services		
1.3	Types of OS		
1.4	Concepts of OS		
1.5	Different Views Of OS		
2.	**Process Management**	**04 Hours**	**08%**
2.1	Process, Process Control Block, Process States,		
2.2	Threads, Types of Threads and Dispatching, Concurrent Threads		
3.	**Inter process Communication**	**08 Hours**	**15%**
3.1	Race Conditions, Critical Section, Co-operating Thread/Mutual Exclusion		
3.2	Hardware Solution, Strict Alternation, Peterson's Solution		
3.3	The Producer Consumer Problem, Semaphores, Event Counters, Monitors		
3.4	Message Passing and Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem.		
4.	**Deadlock**	**06 Hours**	**15%**
4.1	Deadlock Problem, Deadlock Characterization		
4.2	Deadlock Detection, Deadlock recovery		
4.3	Deadlock avoidance: Banker's algorithm for single & multiple resources		
4.4	Deadlock Prevention.		
4.5	CPU Scheduling, Protection: Address space, Address Translation		
5.	**Memory Management**	**08 Hours**	**18%**
5.1	Paging: Principle of Operation, Page Allocation, H/W Support For Paging		
5.2	Multiprogramming with Fixed partitions		
5.3	Segmentation		
5.4	Swapping		
5.5	Virtual Memory: Concept, Performance Of Demand Paging, Page Replacement Algorithms, Thrashing and Working Sets		
6.	**Input Output Management**	**07 Hours**	**14%**
6.1	I/O Devices, Device Controllers, Direct Memory Access		

6.2 Principles of Input/output S/W: Goals of The I/O S/W, Interrupt Handler, Device Driver, Device Independent

6.3 I/O Software Disks: RAID levels, Disks Arm Scheduling Algorithm, Error Handling.

7. File Systems **06 Hours** **15%**

7.1 File Naming, File Structure, File Types, File Access, File Attributes, File Operations, Memory Mapped Files

7.2 Directories: Hierarchical Directory System, Pathnames, Directory Operations,

7.3 File System Implementation, Contiguous Allocation, Linked List Allocation, Linked List Using Index, Inodes

8. Unix/Linux File System **04 Hours** **10%**

8.1 Buffer Cache, Inodes, The system calls: ialloc, ifree, namei, alloc and free

8.2 Mounting and Unmounting, files systems, Network File systems

8.3 EXT file system in Linux

Course Outcome (COs):

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

CO1	Visualize and understand Operating system functionality and working of OS. Understanding of functionality, services of operating system and differentiate between different types of OS.
CO2	Define thread and process. Visualize how processes and threads are managed by the operating systems. Simulate and analyze various process scheduling algorithms. Explain and analyze different Inter process communication techniques
CO3	Describe deadlock and classify detection, recovery, prevention and avoidance algorithms. Test scenarios to report deadlock
CO4	Compare and evaluate various memory management schemes. Simulate and analyze Memory management algorithms. Identify and describe the role of I/O devices.
CO5	Understand the file systems. Understand the secondary storage and simulate disk scheduling algorithm.
CO6	Understand the basic commands of Linux file systems

Course Articulation Matrix:

	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	2	-	-	-	-	-	-	1	-	-
CO2	3	2	-	-	2	-	-	-	-	-	-	-	1	-
CO3	3	2	-	-	2	-	-	-	-	-	-	-	1	-

CO4	3	2	-	-	2	-	-	-	-	-	-	-	1	-
CO5	3	2	-	-	2	-	-	-	-	-	-	-	1	-
CO6	3	2	-	-	2	-	-	-	-	-	-	1	1	-

Enter correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial

(High) If there is no correlation, put "-"

Recommended Study Material:

- **Text Books:**
  1. Modern Operating Systems -By Andrew S. Tanenbaum, Third Edition PHI
  2. Operating System Concepts Avi Silberschatz, Peter Baer Galvin, Greg Gagne, Ninth Edition, Wiley
- **Reference Books:**
  1. Operating Systems, D.M. Dhamdhare, TMH
  2. Operating Systems Internals and Design Principles , William Stallings , Seventh Edition, Prentice Hall
  3. Unix System Concepts & Applications, Sumitabha Das, TMH
  4. Unix Shell Programming, Yashwant Kanitkar, BPB Publications