Course Code:	UCSC0503		L	T	P	Credit
Course Name:	Operating Systems		3			3

Course Prerequsites:

Fundamentals of Electronics and Computer

Course Description:

This is one of the core course of Computer Science & Engineering Programme. In this course you will become familiar with the core concepts of OS - how OS work, how a **processes & threads** are created, **inter-process communication & synchronisation**, the various **scheduling** algorithms, **memory management** & memory allocation strategies, etc. This course will be also helpful for exams like GATE.

Course Outcomes: After the completion of the course the student will be able to -

CO1	describe the basic concepts of operating systems.
CO2	evaluate the performance of various scheduling & page replacement algorithms.
CO3	distingush techniques of inter process communication and synchronization.
CO4	identify potential deadlock situations and propose appropriate strategies to handle or avoid deadlocks.
CO5	interpret internal representation of file and buffer cache management.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2								1		2	1	
CO2	2	2			2				1	2				
CO3	1	1	2	1	3							1		2
CO4	2	2		1	1								1	2
CO5				1							1	1	1	

Assessment Scheme:

SN	Assessment	Weightage	Remark
1	In Semester Evaluation 1 (ISE1)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
2	Mid Semester Examination (MSE)	30%	50% of course contents
3	In Semester Evaluation 2 (ISE2)	10%	Assignment, Test, Quiz, Seminar, Presentation, etc.
4	End Semester Examination (ESE)	50%	100% course contents

Course Contents:

Unit 1 Introduction — **5 Hours**

Introduction to OS, OS Structure, Types of OS, OS Kernel, OS Services, Users Prespective of OS, System Boot Process, Architecture of UNIX OS

Unit 2 Process, Threads & Scheduling — **7 Hours**

Process: Concept, States and Transitions, Context, Creation (fork), Termination (exit), Signals (signal, kill), Awaiting Process Termination(wait, waitpid), Invoking other programs (exec), Threads (pthreads)
Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

Unit 3 Synchronization and Communication (Process & Thread) — **8 Hours**

Inter-Process Communication - Pipe, Shared Memory, Message Passing
Inter-Process Synchronization: The Critical Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization

Unit 4 Deadlocks — **5 Hours**

Deadlock: System Model; Deadlock Characterization; Methods for Handling Deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection and Recovery from Deadlock

Unit 5 Buffer Cache and Internal Representation of Files — **7 Hours**

Buffer Cache: Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of a Buffer, Reading and Writing Disk Blocks, Advantages and Disadvantages of Cache. Internal Representation of Files: I-nodes, Structure of a Regular File, Directories, Conversion of a pathname to i-node

Unit 6 Memory Management — **8 Hours**

Memory background, Hierarchy, Swapping, Contiguous Memory Allocation, Segmentation, Paging, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.
Text Books:
1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Principles, 8th edition, Wiley India, 2009. 2. The Design of Unix Operating System - Maurice J. Bach (PHI)
Reference Books:
1. Operating Systems –Concepts and design –Milan Milenkovic (TMGH) 2. Operating Systems: Internals and Design Principles (8th Edition)- by William Stallings (Pearson Education) 3. Modern Operating Systems by Andrew S. Tanenbaum (Pearson Education International) 4. Unix concepts and administration – 3rd Edition – Sumitabha Das (TMGH).