CSEN1101	OPERATING SYSTEMS	L	T	P	S	J	C
		3	0	2	0	0	4
Pre-requisite	Knowledge of any programming language and data structures						
Co-requisite	**None**						
Preferable exposure	**None**						

Course Description:

Operating system is an essential part of any computer system. This course is designed to explain the basics and the applications of operating system, the working of operating system. This course also focuses on other concepts of operating system: scheduling Algorithms, process management and process synchronization. It also gives us a detailed idea about memory management and file concepts

Course Educational Objectives:

- To introduce students with basic concepts of operating system, its functions and services.
- To provide the basic concepts of process management and synchronization.
- To familiarize the dead lock issues.
- To understand the various memory management schemes.
- To give exposure over mass storage structures and system protection.

UNIT 1 Operating system Structures: 8 hours

Introduction: What operating systems do, computer system organization, computer-system architecture, operating system structure, resource management, Protection and security, kernel data structures

Operating system Structures: operating system services, system calls, loaders and linkers,

operating system structure, building and booting an operating system.

UNIT 2 Process Management & CPU Scheduling 8 hours

Process Management: Process concepts, process scheduling, Operations on processes, inter- process communication

CPU Scheduling: Multithreaded programming, Multi-core Programming, Multi-threading Models, Scheduling-criteria, scheduling algorithms, algorithm evaluation.

UNIT 3 Process Synchronization & Deadlock 8 hours

Process Synchronization: Critical section problem, Peterson's solution, synchronization hardware, Mutex locks, semaphores, monitors, classic problems of synchronization.

Deadlock: System model, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

UNIT 4 Memory Management & Virtual memory 8 hours

Memory Management: contiguous memory allocation, paging, segmentation, structure of page the table, swapping.

Virtual memory: Demand paging, Copy-on-Write, page-replacement, allocation of frames, thrashing.

UNIT 5 Mass-storage structure & System Protection 8 hours,

File Concepts: File concept, access Methods, directory and disk structure, protection.

Mass-storage structure: Overview of Mass-Storage Structure, disk scheduling, Swap space management

System Protection: Goals of protection, principles of protection, Domain of protection, Access matrix.

Software requirements: Linux's Shell

Operating System: Ubuntu, Linux Operating System

1. Familiarity and usage of Linux System calls
a. Process management: fork(), exec(), wait(), sleep() ...,
b. File management: open (), read (), write (), seek (), close ()...
2. Simulate the following CPU scheduling algorithms
A) FCFS b) SJF c) Round Robin d) Priority
3. Write a program to Implement Producer Consumer Problem solution
4. Simulate Bankers Algorithm for Dead Lock Avoidance
5. Simulate the page replacement algorithms
a) FIFO b) LRU c) LFU d) Optimal Page Replacement
6. Simulate Paging Technique of memory management.
7. Simulate all File Organization Techniques
a) Single level directory b) Two level c) Hierarchical
8. Write a program to implement disk scheduling algorithms.
a) FCFS b) SCAN c) C-SCAN

TextBooks:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 10/e, John Wiley, 2018.

References:

1. Andrew S Tanenbaum, Modern Operating Systems, 2/e, Pearson/PHI, 2014.
2. Crowley, Operating System- A Design Approach, McGraw-Hill, 2012.
3. Stallings, Operating Systems - Internal and Design Principles, 5/e, 2013.
4. Pal Chaudhary, Operating system principles & Design, 1/e, PHI Learning, 2013.
5. Deitel and Deitel, Operating System, Pearson Education, 2003.
6. D.M. Dhamdhere, Operating systems- A Concept based Approach,2/e, McGraw Hill, 2010.

Course Outcomes:

After successful completion of the course the student will be able to:

1. illustrate the basic and overall view of operating system
2. analyze the concept of a process, process life cycle, process states and state transitions
3. implement and practice CPU scheduling strategies, process synchronization techniques and memory-management schemes
4. simplify and resolve Deadlock handling situation
5. evaluate Disk storage management, protection and security mechanisms

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1					2									2	
CO2			2											3	
CO3	3	3	2										2	1	1
CO4		1	1											1	
CO5		1	1												1

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation