Course Code	**CET2003B**			
Course Category	**Professional Core**			
Course Title	**Operating Systems**			
Teaching Scheme and Credits Weekly load hrs	**Lecture**	**Tutorial**	**Laboratory**	**Credits**
	3 hr/wk	**–**	**2 hr/wk**	**3+1=4**

Pre-requisites:

- Fundamentals of Computers

Course Objectives:

1. Knowledge

i. To study functions of Operating Systems

ii. To learn the basics of Unix Operating System

2. Skills

i. To design and implement algorithms of Operating Systems

ii. To implement shell scripting

3. Attitude

i. To apply the knowledge of Operating Systems in solving real life problems ii. To design algorithms towards optimization of Operating System functions

Course Outcomes:

1. Comprehend the functionalities of Operating Systems.
2. Comprehend and simulate the concepts of process and thread management. 3. Design and Implement the Process Synchronization concepts
4. Comprehend and Implement algorithms of Memory and I/O Management. 5. Ability to write basic shell scripts

Course Contents:

1. Overview of Operating Systems
2. Process Management
3. Process Synchronization
4. Memory Management, File Management & I/O Management.
5. Unix Operating System

Laboratory Exercises:

1. A presentation based on applications of an Operating System.
2. Process Management (Process control)
3. Process Management (Scheduling)
4. Process Synchronization (Deadlocks)
5. Process Synchronization (classical problems)
6. Process Management (Inter-process Communication)
7. Memory Management (Page Replacement Algorithms)
8. Shell Scripting (Basic)
9. Shell Scripting (utility)
10. Presentation of the Design of an Operating System by selecting appropriate system parameters.

Learning Resources:

Text Books:

1. Operating System Concepts, Tenth Edition,Avi Silberschatz Peter Baer Galvin Greg 2. Gagne John Wiley & Sons, Inc. ISBN 978-1-118-06333-0
3. The Design of the Unix Operating System by by Maurice Bach,Pearson Publications 4. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, ISBN 10: 0-13-380591-3, ISBN-13: 978-0-13-380591-8, 8th Edition.
5. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, WILEY, ISBN 978-1-118-06333-0, 9th Edition.
6. Unix & Shell Programming by Sumitabha Das,McGraw Hill Publications 7. Unix Unleashed by Robin Burk,SAMS publications

Supplementary Reading:

1. Andrew Tanenbaum, Modern Operating Systems, Peasrson,4th Edition.

Web Resources:

Ebooks

1. http://engineeringppt.blogspot.in/2009/07/operating-system-concepts-8th-edition.html **Weblinks:**

1. https://www.google.co.in/search?q=advanced+programming+in+unix+environment&ie=ut f-8&oe=utf-8&client=firefox-b&gfe_rd=cr&dcr=0&ei=5khOWtHyCK_T8geE65jQAQ http://williamstallings.com/OperatingSystems/

MOOCs:

1. https://in.udacity.com/course/introduction-to-operating-systems--ud923 http://nptel.ac.in/courses/106108101/

Pedagogy:

Syllabus: Theory

Module No.	Contents	Workload In Hrs
		Theory
1	**Overview of Operating Systems** Operating System objectives and its evolution. Operating System structure: Layered, Monolithic, Microkernel. Types of Operating Systems. Applications of Operating systems. Operating Systems protection and security.	09
2	**Process Management** Process: Concept of a Process, Process States, Process Control - creation, new program execution, termination. Interposes communication(IPC). Examples of IPC. Threads: Differences between Threads and Processes. Concept of Threads, Concurrency. Multithreading, Types of Threads.POSIX Threads functions. Scheduling: Concept of Scheduler, Scheduling Algorithms: FCFS, SJF, SRTN, Priority, Round Robin	09
3	**Process Synchronization** Process Synchronization Tools: Concept of Mutual Exclusion, The Critical Section Problem. Hardware Support for Synchronization. Semaphores, Mutex Locks, Monitors. Classical synchronization problems: Readers -Writers Problem and Producer Consumer problem. Synchronization within the kernel. Deadlock: Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery.	09
4	**Memory Management,File Management & I/O Management**. Memory Management: Memory Partitioning: Fixed Partitioning,Dynamic Partitioning,Paging, segmentation ,Concept of virtual memory. Page Replacement Algorithms: FIFO, LRU, Optimal. Concept of Locality of Reference, Belady's Anomaly. File Management: File Organization and Access, File Directories, File Sharing, Record Blocking. I/O Management: I/O Devices, Organization of the I/O Functions, I/O Buffering, Disk Scheduling-FCFS, SSTF	09
5	**Unix Operating System**	09

	Introduction to Unix Operating System.The Unix File System and Process Management.Comparison between Windows OS,Unix and Linux. Basics of shell scripting.	

Laboratory:

Assignment No.	Contents	Workload in Hrs
		Lab
1	A presentation based on applications of an Operating System.	02
2	Process Management (Process control) a) Write a program using fork to create a child process. The parent process should sort elements in ascending order and child process should sort elements in descending order. b) Orphan Process c) Zombie process	02
3	**Process Management (Scheduling)** Write a menu driven program to simulate the following CPU Scheduling algorithms: - a. First Come First Serve (FCFS). (Non Pre-emptive) b. Shortest Remaining Time Next (SRTN) (Pre-emptive)	04

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4	**Process Synchronization (Deadlocks)** Write a program to simulate Bankers algorithm for deadlock avoidance.	04
5	**Process Synchronization (classical problems)** Implement Readers- Writers or Producer-Consumer Problem	04
6	**Process Management (Inter-process Communication)** Implement Pipe and / Shared Memory Concept	02
7	**Memory Management** (Page Replacement Algorithms) Write a menu driven program to simulate the following page replacement algorithms: First in First Out (FIFO) Least Recently Used (LRU).	02

8	**Shell Scripting** Write a program to implement Shell Scripting - Arithmetic operations	04
9	**Shell Scripting** Write the copy utility.	04
10	Presentation of the Design of an Operating System by selecting appropriate system parameters	02

Dr.Prasad Khandekar
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