

Objective: This course enables students to understand Operating System and their standards. Students will understand the concepts of CPU scheduling, memory management, file system, through scheduled lectures and labs. Also this course emphasis on Linux as open source operating system utilities and scripting.

Credits Earned: 5 Credits

Course Outcomes: After completion of this course, student will be able to

- Operating System and their standards
- Assess effectiveness of Processor and Memory
- Understand Inter-Process Communication
- Learn Linux Utilities and Scripting

Pre-requisite of course: Data structures like stack, queue, linked list, tree, graph, hashing, file structures, any structured programming language (like C)

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
3	0	4	5	50	30	20	25	25	150



Contents:

Unit	Topics	Contact Hours
1	Operating Systems Operating System overview, Operating System concepts, Functions of OS, System call ,Types of operating system and structures of operating system	3
2	Process and Threads Process, Process States, Process Control Block, Threads, Multithreading, Process Scheduling, Scheduling-criteria, algorithms -First Come First Served (FCFS),Shortest Job First (SJF),Round Robin(RR), Priority, Shortest Remaining Time Next(SRTN)	5
3	Interprocess Communication Process Synchronization, race conditions, critical region problem, Mutual exclusion, classical problems of IPC, Concepts of Semaphore – Mutex – Monitor –Event Counters , Message Passing	4
4	Deadlocks Deadlock concepts and its characterization ,deadlock detection, prevention techniques of deadlock , techniques to get recovery from deadlock and deadlock avoidance	3
5	Memory Management Contiguous Memory Allocation, Swapping, paging concepts, segmentation, virtual memory, demand paging, page fault , page replacement policies- First In First Out (FIFO), Least Recently Used (LRU), Optimal(OPT)	5
6	File Management and Disk Structure File-Concept of file, attributes and operations of file, file accessing methods, directories, file sharing and protection. Disk-Disk structure- physical and logical structure ,disk hardware, Disk Scheduling	5



7	Linux Introduction to Linux, Shell and commands-pwd, cd, mkdir, rmdir, ls, cat, cmp, cp, rm, mv, echo, wc, comm, head, tail, grep, sort and related shell script programs.	3
	Total Hours	28

References:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 8th edition.
2. Operating Systems - Internals and Design Principles. William Stallings, 6th Edition- 2009. Pearson education.
3. Operating systems- A Concept based Approach-D.M.Dhamdhare. 3rd Edition. TMH
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.
5. Operating Systems. A.S. Godboie. 2nd Edition, TMH
6. Linux –Application and administration- Ashok Kumar Harnal , 2009 Edition, TMH

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
35%	35%	30%	0%	0%	0%

Suggested List of Experiments:

1. Study of Basic commands of Linux.
2. Study of Advance commands and filters of Linux
3. Write a shell script to print “Hello world”.
4. Write a shell script that accepts a name string from user and print it with proper title.
5. Write a shell script that performs simple arithmetic operation on given input.
6. Write a shell script to generate grade sheet of a student which accepts marks of five subjects, calculate and display total marks, percentage and grade obtained by the student.
7. Write a shell script to add and print all even numbers between given range.
8. Write a shell script to generate Fibonacci number from 1 to n.
9. Write a shell script to find factorial of given number n.
10. Write a shell script to generate prime numbers from 1 to n
11. Write a shell script that reverses the number.
12. Write a shell script to check whether the entered number is Armstrong number or not using the command line argument.
13. Write a shell script to check whether the string is palindrome.
14. Write a shell script that reverses the string.
15. Write a shell script that evaluates the following series $1 + 1/1 + 1/2 + 1/3 + \dots + 1/n$.
16. Write a shell script to read n numbers as command arguments and sort them in ascending order.
17. Write a shell script to wish Good morning, Good afternoon and Good night as per current system time.
18. Write a shell script to count number of characters, words & lines.
19. Write a shell script for calendar for current month & year also for range of months.
20. Write a shell script to convert lowercase to uppercase letter for a given file.
21. Write a shell script for comparison between two strings whether both the strings are equal or not.
22. Write a shell script to accept two filenames, if both files exist then contents of first file should appended to second. If second file does not exist then create it with the contents of first file.

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

1. <http://williamstallings.com/OS/Animation/Animations.html>
2. <http://nptel.ac.in/courses/106106144/>
3. <http://nptel.ac.in/courses/106108101/>