

Branch Name:	Artificial Intelligence & Data Science
Semester/Year:	Semester IV / Second Year
Subject Title:	Operating System
Subject Code:	1ET1030402
Pre-requisite:	Data Structure, Basic Programming knowledge

Course Objective:

This course enables to understand value of Operating System, its role to manage resources of Computer and Peripherals, Student will gain knowledge of different aspect of Os like Process Management, Memory Management, File Management and I/O Management in detail with prominence given to Linux type of Open Source Operating System.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
4	-	2	5	70	30	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Introduction: Objective of Operating Systems: Definition, Evolution of Operating systems, Types of Operating Systems, OS Services, System Calls, OS structure: Layered, Monolithic, Microkernel Operating Systems	5	10	
2	Process Concepts: Overview, Process Relationship, Process states, Process State transitions, Process Control Block, Context switching, Threads, Concept of multithreads, Advantages and Type of threads	5	9	
3	Process Scheduling: Scheduling objectives, Types of Schedulers, Scheduling criteria, Scheduling algorithms, Multiprocessor scheduling, Thread Scheduling Performance Analysis of the scheduling.	5	10	
4	Interprocess Communication: Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Message Passing, and Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem, Monitors	7	13	
5	Deadlocks: Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance banker's algorithm, Deadlock detection and Recovery.	5	10	
6	Basic Memory Management: Background of Memory management, Swapping, Contiguous Memory allocation, Paging, Structure of Page Table, segmentation	5	10	

7	Virtual Memory: Basics of Virtual Memory ,Demand paging, Page Replacement policies : Optimal (OPT) , First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU)	5	10
8	Storage Structure & I/O Management: Overview of Secondary Storage Structure, Disk structure ,Disk scheduling algorithm, RAID Structure ,Principles of I/O Hardware :I/O devices, Device controllers , Direct memory access Principles of I/O Software: Goals of Interrupt handlers , Device drivers , Device independent I/O software	6	13
7	File Management File concept, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous,linked,indexed), Free- space management (bit vector, linked list, grouping),directory implementation (linear list, hash table).	5	9
9	Basics of Unix/Linux Operating System Development Of Unix/Linux, Role & Function Of Kernel, Directory Structure, System Administration	4	6

Course Outcome:

After successful completion of this course, student will be able to

- Know the Basic components of operating system.
- Understand the working and Functions of Operating System.
- Perform Basic Shell Script Programming.

List of References:

1. Operating System Concepts (8th Edition) by Silberschatz, Peter B. Galvin and Greg Gagne, Wiley Indian Edition (2010).
2. Modern Operating Systems (Third Edition) by Andrew S Tanenbaum, Prentice Hall India(2008).
3. Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall India, 2000
4. Operating Systems by D.M. Dhamdhere, Tata McGraw Hill 2nd edition.
5. Principles of Operating Systems by Naresh chauhan, Oxford Press (2014).
6. UNIX Shell Programming – by Yashwant Kanetkar, BPB publications.

List of Experiments:

1. Study of Basic commands of Linux/UNIX
2. Write a Shell Script to Display Student Personal Information.
3. Write a shell script to generate mark sheet of a student. Take 3 subjects, calculate and display total marks, percentage and Class obtained by the student.
4. Write a shell script to find factorial of given number n.
5. Write a shell script which will accept a number b and display first n prime numbers as output.
6. Write a shell script which will generate first n Fibonacci numbers like: 1, 1, 2, 3, 5, 8.....
7. Write a shell script to check entered string is palindrome or not.
8. Write a shell script to read n numbers as command arguments and sort them in descending order.
9. Write a program for process creation using C.