Branch Name:	Computer Engineering / Information and Communication Technology / Artificial Intelligence and Data Science
Program Code:	ET103 / ET107 / ET108
Course Title:	Operating System
Course Code:	2ET1030402T
Pre-requisite Course:	Fundamentals of Computer Organization & Architecture, basic UNIX commands, Data Structures and Algorithms

Course Objective:

1. This course enables to understand value of Operating System, its role to manage resources of Computer and Peripherals
2. 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 and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
					SEE		CCA		SEE		CCA		
	L	T	P	Total	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Sr. No	Topic	Total Hours	Weight (%)
1	**Introduction:** Computer system overview, Goals & Structures of OS, Basic functions, Interaction of OS & hardware architecture, System calls, Batch, multiprogramming, Multitasking, Types of Operating Systems.	04	10
2	**Process and Threads Management:** Programs Vs Process Vs Thread, Process State Transition diagram, CPU switching from process to process, Process Control Blocks and attributes, System calls for process management, Types of Schedules - Job Scheduling Vs CPU scheduling, short term, medium term and long-term schedulers, Process Scheduling Algorithms and Examples, Process synchronization issue	08	20
3	**Inter process 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, Dinning Philosopher Problem, Monitors **Deadlocks:** Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance, Deadlock detection and Recovery.	12	30
4	**Memory Management:** Memory Management requirements, Memory partitioning: Fixed and Variable Partitioning, Memory Allocation: Allocation Strategies (First Fit, Best Fit, and Worst Fit), Swapping, Paging and Fragmentation. Demand Paging, Security Issues. **Virtual Memory:** Concepts, VM management, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing	08	20
5	**I/O Management & Disk scheduling:** I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN, SSTF), RAID, Disk Cache.	05	15
7	**Unix/Linux Operating System:** Development of Unix/Linux, Role & Function of Kernel, Elementary Linux Command & Shell Programming, Directory Structure, System Administration Case study: Linux, Windows Operating System	03	05

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.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the overall view of the computer system and operating system	1. Remember 2. Understanding
CLO2	Identify various scheduling algorithm and deadlock prevention and avoidance algorithm	2. Understanding 3. Applying
CLO3	Compare and contrast various memory management schemes and file system functionalities	2. Understanding
CLO4	Discuss the performance of the various page replacement algorithms and interpret the file system implementation, sharing and protection mechanisms.	2. Understanding
CLO5	Demonstrate administrative tasks on Linux servers and to be familiar with the basics of Mobile OS.	2. Understanding 3. Applying
CLO6	Make use of various algorithms to solve computing problems	2. Understanding 3. Applying

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	M	L	L			M			H	L	M		M	M		
CLO2	M	L	L			M			H	L	M		M	M		
CLO3	M	L	L			M			H	L	M		M	M		
CLO4	M	L	L			M			H	L	M		M	M		
CLO5	H	M	M			H			H	L	M		M	M		
CLO6	H	M	M			H			H	L	M		M	H		

H: High, M: Medium, L: Low