



Operating System

S.N	TOPICS	Teaching Hour
1	1.1. Operating System Overview: 1.1.1. Introduction of Operating System and its function 1.1.2. Components of Operating System 1.1.3. Evolution/History of operating system 1.1.4. Types of Operating System 1.1.5. Operating System Structure 1.2. System Calls 1.2.1. Definition 1.2.2. Handling System Calls 1.2.3. System calls for Process, File, and Directory Management, System Programs	4 hours
2	2.1. Process Management 2.1.1. Introduction to Process, Process vs Program, Multiprogramming 2.1.2. Process Model, Process Control Block/Process Table 2.2. Thread 2.2.1. Definition, Thread vs Process 2.2.2. User and Kernel Space threads 2.3. Inter Process Communication 2.3.1. Definition 2.3.2. Race condition and critical section 2.4. Mutual Exclusion 2.4.1. Mutual Exclusion with busy waiting (Disabling Interrupts, Lock Variables, Strict Alteration, Peterson's Solution, Test and Set Lock) 2.4.2. Sleep and wakeup, Semaphore, Monitors, Message Passing 2.5. IPC problems: 2.5.1. Producer Consumer, Sleeping Barber,	10 hours

	<p>and Dining Philosopher and Problem</p> <p>2.6. Process Scheduling</p> <p>2.6.1. Definition</p> <p>2.6.2. Batch System Scheduling (First-Come First-Served, Shortest Job First, Shortest Remaining Time Next), Interactive System Scheduling (Round-Robin Scheduling, Priority Scheduling, Multiple Queues)</p>	
3	<p>3.1. Deadlock</p> <p>3.1.1. Definition</p> <p>3.1.2. Deadlock characterization</p> <p>3.1.3. Deadlock conditions</p> <p>3.2. Handling Deadlocks</p> <p>3.2.1. Ostrich Algorithm, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from deadlock</p>	6 hours
4	<p>4.1. Memory Management</p> <p>4.1.1. Memory Management Background</p> <p>4.1.2. Logical vs. physical address space</p> <p>4.1.3. Swapping</p> <p>4.1.4. Contiguous memory allocation</p> <p>4.1.5. Paging</p> <p>4.1.6. Segmentation</p>	6 hours
5	<p>5.1. Virtual Memory Management</p> <p>5.1.1. Background</p> <p>5.1.2. Paging, page table, page table structure, Demand paging, handling page faults, TLB's</p> <p>5.1.3. Page replacement algorithm</p>	2 hours
6	<p>6.1. File Systems</p> <p>6.1.1. File concept, file system, File structure, File types, file attributes, file access methods, Directories structure</p> <p>6.2. Implementation</p> <p>6.2.1. Contiguous allocation</p> <p>6.2.2. Linked List Allocation (Linked List Allocation</p>	6 hours

	using Table in Memory/ File Allocation Table, Inodes.)	
7	7.1. Device Management 7.1.1. Classification of IO devices, Controllers, Memory Mapped IO, DMA Operation, Interrupts 7.2. IO Handling 7.2.1. Goals of IO Software, Handling IO(Programmed IO, Interrupt Driven IO, IO using DMA), IO Software Layers (Interrupt Handlers, Device Drivers) 7.3. Disk Management 7.3.1. Disk Structure, Disk Scheduling (FCFS, SSTF, SCAN, CSCAN, LOOK, CLOOK), Disk Formatting (Cylinder Skew, Interleaving, Error handling), RAID	6 hours

Main references supporting the course:

Modern Operating Systems: Andrew S. Tanenbaum, PH1 Publication, Third edition, 2008

Additional references supporting the course

An Introduction to Operating Systems: Concepts and Practice by Pramod Chandra Bhatt, 2010.

Operating Systems: Internals and Design Principles by William Stallings, 7thEdition,(2011)