UE18CS302 : OPERATING SYSTEM (4:0:0:0:4)

# of Hours: 56

Class #	Unit description	Topic to be covered	Percentage of portions covered	
			% of Syllabus	Cumulative %
1	Unit 1 T1 (Chap 1-3,5)	Introduction: What Operating Systems Do, Computer-System Organization	21.40%	21.40%
2		Computer-System Architecture, Operating-System Structure & Operations		
3		Kernel Data Structures, Computing Environments		
4		Operating-System Services, Operating-System Design and Implementation		
5		Process concept: Process in memory, Process State, PCB, Context Switch, Process Creation and Termination		
6		CPU Scheduling & Scheduling Algorithms, Preemptive and Non-Preemptive, Scheduling criteria,		
7		Scheduling Algorithms: FIFO, SJF		
8		Round Robin, Priority Scheduling		
9		Multi-Level Queue, Multi-Level Feedback Queue		
10		Case Study: Linux/ Windows Scheduling Policies.		
11		Inter Process Communication – Shared Memory, Messages		
12		Named and unnamed pipes		
13	Unit 2 T1(Chap 4-7)	Introduction to Threads, types of threads, Multicore Programming, Multithreading Models ,	21.40%	42.80%
14		Thread creation, Thread Scheduling		
15		Pthreads and Windows Threads		
16		Mutual Exclusion and Synchronization, software approaches,		
17		principles of concurrency, hardware support		
18		Mutex Locks, Semaphores		
19		Classic problems of Synchronization:		
		Bounded-Buffer Problem, Readers-Writers problem		
20		Dining-Philosophers Problem		
21		Synchronization Examples: Synchronisation mechanisms provided by		
		Linux/Windows/Pthreads.		
22		Deadlocks: principles of deadlock, Deadlock Characterization		
23		Deadlock Prevention, Deadlock example		
24		Deadlock Detection, Algorithm	21.40%	
25		Main Memory: Hardware and control structures, OS support, Address translation		
26		Dynamic linking, Swapping		

27	Unit 3 T1 (Chap 8-9)	Memory Allocation (Partitioning, relocation), Fragmentation		64.20%
28		Segmentation		
29		Paging: OS Support, TLBs, Address Translation		
30		Structure of the Page Table		
31		Design Alternatives – Inverted Page Tables, Bigger Pages		
32		Virtual Memory: Demand Paging, Copy-OnWrite		
33		Page replacement policy – LRU		
34		FIFO & Optimal		
35		Thrashing		
36		Case Study: Linux/ Windows Memory Management		
37	Unit 4 T1 (Chap 10-14,16)	Mass-Storage Structure: Mass-Storage overview	17.80%	82.10%
38		Disk Scheduling – FCFS, SSTF, SCAN, C-SCAN, LOOK		
39		Swap-Space Management, RAID Structure		
40		File Concept, File Structure, Access Methods		
41		Directory and Disk Structure		
42		File-System Mounting, File Sharing, Protecting		
43		Implementing File-Systems: File control Block (inode), partitions & mounting		
44		Disk Space Allocation methods: Contiguous, Linked, Indexed		
45		Case Study: Unix/Linux File systems		
46		NFS		
47	Unit 5 T1 (Chap 14-15,21)	I/O Hardware, polling and interrupts	17.80%	100%
48		DMA		
49		Transforming I/O Requests to Hardware Operations, Device interaction, device driver, buffering.		
50		Goals, Principles and Domain of Protection		
51		Access Matrix		
52		Access control, Access rights		
53		The Security Problem		
54		Program Threats		
55		System Threats and Network Threats		
56		Case Study : Linux & Windows		

Pre-requisite Courses: Data Structures, Microprocessor and Computer Architecture.

Text Book:

Operating System Concepts, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne 9th Edition, John_Wiley_&_Sons, 2013.

References:

1. Operating Systems, Internals and Design Principles, William Stallings, 9th Edition, Pearson, 2018

2. Operating Systems: Three Easy Pieces, Remzi Arpaci-Dusseau and Andrea Arpaci Dusseau, http://pages.cs.wisc.edu/~remzi/OSTEP/
3. Advanced Programming in the Unix Environment", Richard Stevens and Stephen A Rago, Pearson, 3rd edition,2017
4. Operating Systems, Harvey Deitel, Paul Deitel, David Choffnes, 3rd Edition, Prentice Hall
5. Modern Operating Systems, Andrew S Tannenbaum, 3rd edition, Pearson