**CSE 309 Operating System and LINUX**

**[3 1 0 4]**

Operating Systems and its operations, Special Purpose Systems.O.S ervices, User O.S Interfaces, System Calls,System Programs, O.S Structure, Virtual Machines, System Boot Process Concepts, scheduling, Operations on Processes, Interprocess Communication , Multithreaded Models, Thread Libraries, Threading Issues, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Linux Scheduling, Algorithm Evaluation Background, Classical problems of synchronization, Deadlock Characterization, Methods for handling deadlocks ,Contiguous Memory Allocation, Paging,Segmentation, Demand Paging, Copy-On-Write, Page Replacement, Allocation of Frames, Thrashing, File Concept, Access Methods, Directory Structure, File System, Access Matrix and Implementation, The Security Problem, Program Threats, System and Network threats, User Authentication ,Linux systems

**References:**

1. A. Silberschatz, P. B. Galvin and G. Gagne, “Operating System Concepts”, International student version, Wiley India Student Edition, Eighth Edition, 2009.
2. William Stallings, “Operating Systems: Internals and Design Principles”, Pearson Ed., LPE, Sixth Edition, 2009.
3. D. M. Dhamdhere, “Operating Systems: A Concept Based Approach”, Tata McGraw-Hill publications, Second Edition, 2006.

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1. INTRODUCTION:

What Operating Systems do, Operating System Structure, Operating System Operations, Process Management, Memory Management, Storage Management, Protection and Security, Special Purpose Systems.(Sections 1.1, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11 of Chapter 1 from Text Book 1) (3 hrs)

1. SYSTEM STRUCTURE:

Operating System Services, User Operating System Interfaces, System Calls, Types of System Calls, System Programs, Operating System Structure, Virtual Machines, System Boot. (Sections 2.1, 2.2, 2.3, 2.4, 2.5, 2.7, 2.8, 2.11 of Chapter 2 from Text Book1). (3hrs)

1. PROCESS CONCEPT:

Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication.(Sections 3.1, 3.2, 3.3, 3.4 of Chapter 3 from Text Book1).(3 hrs)

1. MULTITHREADED PROGRAMMING:

Overview, Multithreaded Models, Thread Libraries, Threading Issues, Linux Threads.(Sections 4.1, 4.2, 4.3, 4.4, 4.5 of Chapter 4 from Text Book 1). (3 hrs)

1. PROCESS SCHEDULING:

Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Thread Scheduling, Linux Scheduling, Algorithm Evaluation. (Sections 5.1, 5.2, 5.3, 5.4, 5.6.3, 5.7 of Chapter 5 from Text Book 1). (5 hrs)

1. SYNCHRONIZATION:

Background, Critical Section Problem, Peterson’s Solution, Synchronization Hardware, Semaphores, Classical Problems of Synchronization, Monitors, Synchronization in Linux. (Sections 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7, 6.8 of Chapter 6 from Text Book1). (4 hrs)

1. DEADLOCKS:

System Model, Deadlock Characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.(Sections 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7 of Chapter 7 from Text Book 1).

(5 hrs)

1. MEMORY MANAGEMENT STRATEGIES:

Logical Versus Physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Page Table Structure, Segmentation, Example: The Intel Pentium. (Sections 8.1.3, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7 of Chapter 8 from Text Book 1). (4 hrs)

1. VIRTUAL MEMORY MANAGEMENT:

Background, Demand Paging, Copy-On-Write, Page Replacement, Allocation of Frames, Thrashing, Allocating Kernel Memory, Other Consideration.(Sections 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.8, 9.9 of Chapter 9 from Text Book 1) (6hrs)

1. FILE SYSTEM:

File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection.(Sections 10.1, 10.2, 10.3, 10.4, 10.5, 10.6 of Chapter 10 from Text Book1). (4 hrs)

1. SECONDARY STORAGE:

Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management.(Sections 12.2, 12.4, 12.5, 12.6 of Chapter 12 from Text Book 1). (2 hrs)

1. SYSTEM PROTECTION:

Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix.(Sections 14.1, 14.2, 14.3, 14.4, 14.5 of Chapter 14 from Text Book 1). (2 hrs)

1. SYSTEM SECURITY:

The Security Problem, Program Threats, System and Network threats, User Authentication.(Sections 15.1, 15.2, 15.3, 15.5 of Chapter 15 from Text Book 1)

(2 hrs)

1. LINUX SYSTEM:

Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Interprocess Communication, Security.(Sections 21.2, 21.3, 21.4, 21.5, 21.6, 21.7, 21.9, 21.11 of Chapter 21 from Text Book 1)

(2 hrs)

**Text Books:**

1. A. Silberschatz, P. B. Galvin and G. Gagne, “Operating System Concepts”, International student version, Wiley India Student Edition, Eighth Edition, 2009.

**References:**

1. William Stallings, “Operating Systems: Internals and Design Principles”, Pearson Ed., LPE, Sixth Edition, 2009.
2. D. M. Dhamdhere, “Operating Systems: A Concept Based Approach”, Tata McGraw-Hill publications, Second Edition, 2006.
3. J. Archer Harris, “Operating Systems“, TATA McGraw-Hill publications, 2002.
4. Ida M. Flynn, Ann MclverMcHoes, “Operating Systems”, CENTAGE Learning India Pvt Ltd, India Edition, 2008.