Operating System

Session 1: Introduction

1. Evolution of operating systems (History of evolution of OS with the generations of computers).
2. Types of operating systems, Multitasking, Timesharing, Multithreading, Multiprogramming and, Real time operating systems.
3. Different views of the operating system, System Programmer's view, User's view, Operating system concepts and structure, Layered Operating Systems, Monolithic Systems.
4. **Processes**: The Process concept, The process control block, Systems programmer's view of processes, Operating system services for process management.
5. Scheduling algorithms, First come first serve, Round Robin, Shortest run time next, Highest response ratio next, Multilevel Feedback Queues, Performance evaluation of scheduling algorithms stated above.

Session 2: Memory Management

1. Memory management without swapping or paging, Concepts of swapping and paging.
2. Page replacement algorithms namely, Least recently used, Optimal page replacement, Most recently used, Clock page replacement, First in First out (This includes discussion of Belady's anomaly and the category of Stack algorithms).
3. Modeling paging algorithms, Design issues for paging system, Segmentation, Segmented Paging, Paged Segmentation.

Session 3: Inter- process Communication and Synchronization

1. The need for inter-process synchronization, Concept of mutual exclusion, binary and counting semaphores.
2. Hardware support for mutual exclusion, queuing implementation of semaphores, Classical problems in concurrent programming.
3. Dining Philosopher's problem, Bounded Buffer Problem, Sleeping Barber Problem.
4. Readers and Writers problem, Critical section, critical region and conditional critical region, Monitors and messages.
5. **Deadlocks:** Concepts of deadlock detection, deadlock prevention, deadlock avoidance. Banker's Algorithm

Session 4: File System and Principle of I/O System

1. **File System:** File systems, directories, file system implementation, security protection mechanisms.
2. **Input/output:** Principles of I/O Hardware: I/O devices, device controllers, direct memory access.
3. **Principles of I/O software:** Goals interrupt handlers, device drivers, and device independent I/O software. User space I/O Software.
4. **Disks:** Disk hardware, Disk scheduling algorithms (namely First come first serve, shortest seek time first, SCAN, C-SCAN, LOOK and C-LOOK algorithms) Error handling, track-at-a-time caching, RAM Disks.
5. **Clocks:** Clock hardware, memory-mapped terminals, I/O software.

Session 5: Processors of Distributed System

1. **Processes and Processors in Distributed Systems**: Threads, System models, processor allocation, scheduling.
2. **Distributed File Systems**: Design, Implementation, and trends. Performance Measurement, monitoring and evaluation Introduction, important trends affecting performance issues, why performance monitoring and evaluation are needed, performance measures, evaluation techniques, bottlenecks and saturation, feedback loops.
3. **Case Studies**: WINDOWS and LINUX /UNIX Operating System.

Book References

1. Galvin P., J.L. Abraham Silberschatz. "Operating System Concepts". John Wiley & Sons Company.
2. 1989. Deitel, H.M. "An Introduction to Operating Systems". Addison Wesley Publishing Company 1984.
3. Milenkovic, M., "Operating Systems - concepts and Design" McGraw Hill International Edition- Computer Science series 1992.