Operating System Syllabus

1. Introduction to Operating Systems

- Definition and functions of an operating system
- Types of operating systems: batch, time-sharing, distributed, real-time, and multiprogramming systems
- System calls and operating system structure

2. Process Management

- Process concept and process scheduling
- Operations on processes
- Inter-process communication
- Threads and multithreading models

3. CPU Scheduling

- Scheduling criteria and algorithms: FCFS, SJF, Round Robin, Priority scheduling
- Multilevel queue scheduling
- Multilevel feedback queue scheduling

4. Process Synchronization

- Critical section problem
- Peterson's solution
- Synchronization hardware
- Semaphores and classical problems of synchronization

5. Deadlocks

- System model and deadlock characterization
- Methods for handling deadlocks: prevention, avoidance, detection, and recovery
- Deadlock detection algorithms
- Recovery from deadlock

6. Memory Management

- Logical versus physical address space
- Swapping and contiguous memory allocation
- Paging and segmentation
- Virtual memory and demand paging

- Page replacement algorithms

7. File System Interface

- File concept and access methods
- Directory structure and file system mounting
- File sharing and protection

8. File System Implementation

- File system structure and implementation
- Allocation methods: contiguous, linked, and indexed
- Free-space management
- Directory implementation

9. I/O Systems

- I/O hardware and application I/O interface
- Kernel I/O subsystem
- Transforming I/O requests to hardware operations
- Performance considerations

10. Protection and Security

- Goals of protection and domain of protection
- Access matrix and implementation of access matrix
- Security problems and threats
- Authentication and encryption