# EC-221 Operating Systems - Course Contents

## Deletion of Lab

a. **Credit Hours:** 3+0

b. **Course Objectives:**

To teach students about the fundamental concepts of operating systems covering evolution of operating systems, simple and multiprogramming systems, structures, services, operating system structures, process management, storage management, security and protection, and performance evaluation.

c. **Outcomes:**

After undertaking this course, students will be able to grasp the knowledge about the following:

1) Define and list the functions of an operating system
2) List and explain common features of operating systems
3) Explain the historical reasons why different features of operating systems were developed
4) Contrast batch, on-line (interactive) and real-time processing
5) Contrast real-time transaction processing and process-control operating systems
6) Differentiate between multiprocessing, multiprogramming, and multitasking
7) Explain the purpose and examples of spooling of input and output.
8) Differentiate between programs, processes and threads
9) List resources involved in process creation and management
10) Explain how interrupt requests are handled
11) Describe the process life cycle using a state diagram
12) List and explain scheduling criteria
13) Describe how processes are loaded and swapped
14) Explain how memory is partitioned to run multiple programs
15) Explain the use of paging and segmentation
16) Explain DOS expanded and extended memory
17) Explain advantages of Windows memory management over DOS
18) Describe path names and directory structure visible to end users

19) Describe the related structure of files, inodes and directories
20) Differentiate between hard and symbolic links
21) Compare file naming in UNIX, DOS and Windows
22) List and describe different types of security threats
23) Explain the working of different types of viruses and anti-virus software
24) Describe procedures to minimize security threats, including hardware access restrictions, file protection and backups
25) Describe operating system security features, including access control, audit controls and memory protection
26) Explain the use of encryption and common encryption algorithms

**d. Contents with proposed contact hours**

1. **Basic Concepts :** Early operating systems, buffering and spooling, multiprogramming, time sharing, distributed systems, real time systems, single user systems
2. **Computer System Architecture:** Interrupt based systems, I/O structure, dual-mode protection, hardware protection, general system architecture, symmetric and asymmetric processing
3. **Computer System Structures:** System components, operating-system services, system calls, system programs, system structure, virtual machines, system design and implementation, system generation
4. **Processes**: Process concept, concurrent processes, scheduling concepts, CPU scheduling, scheduling algorithms, multiple processor scheduling, algorithm evaluation
5. **Threads:** Overview, benefits, user/kernel threads, threading models, issues.
6. **Memory Management:** Swapping, single-partition allocation, multiple-partition allocation, multiple base registers, paging, segmentation, paged segmentation
7. **CS Problem and Resolution:** Introduction, problem, race condition, solutions
8. **Deadlocks:** Problem, models, characterization, RA graph, methods of handling deadlocks
9. **Advanced Topics:** Demand paging, performance of demand paging, disk scheduling, file operations

e. **Details of Lab**

| S.No. | Lab Title |
|---|---|
| 1 | Introduction to different types of Operating Systems |
| 2 | Installation and Introduction of Linux |
| 3 | Getting familiar with basic Tools available in Linux |
| 4 | Implementation of First Come First Serve CPU Scheduling Algorithm |
| 5 | Implementation of Shortest Job First CPU Scheduling Algorithm |
| 6 | Implementation of Priority Scheduling Algorithm |
| 7 | Implementation of Round Robin Algorithm |
| 8 | Implementation of FCFS Disk Scheduling Algorithm |
| 9 | Implementation of SSTF Disk Scheduling Algorithm |
| 10 | Implementation of SCAN Disk Scheduling Algorithm |
| 11 | Implementation of CSCAN Disk Scheduling Algorithm |
| 12 | Implementation of Look Disk Scheduling Algorithm |
| 13 | Implementation of CLOOK Disk Scheduling Algorithm |
| 14 | Revision |

**f. Recommended reading, including textbooks, reference books**

**Text Books:**


1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne: Operating System Concepts, John Wiley and Sons, (Latest Issue).
2. William Stallings: Operating Systems (Internals and Design Principles), 5th Edition, Prentice Hall, Latest Issue.


**Reference Book:**


Andrew S. Tanenbaum and Albert S. Woodhull: Operating systems – Design and Implementation, Prentice Hall, (Latest Issue)