

Course Title: Operating Systems

Course Type: Main Course

Unit Type: Theoretical

Units: 3

Prerequisites: Computer Architecture

Project: Yes

Teaching Hours: 48

Objectives:

This course aim to present the structure and organization of operating systems. The students learn the internals of operating systems, interrupts, system calls, the supporting utilities integrated in processors, multi-processing challenges, process synchronization, deadlines, starvation, file systems, scheduling, I/O interaction, memory management, protection and security.

Syllabus:

1. **Introduction:** Definitions, History, The operating system concepts
2. **Processes and Threads:** Processes, Threads, Inter-process communication, Scheduling, Classic IPC Problems
3. **Memory Management:** Memory abstraction, Virtual memory, Paging, Segmentation
4. **Input/Output:** IO hardware, IO software, Disks, Clocks, User interfaces, Power management
5. **Deadlocks:** Deadlock detection and recovery, deadlock avoidance, deadlock prevention
6. **Security:** Access Control, Security Management, Authentication
7. **Case study:** Linux and Unix operating systems
8. **Course projects:** XV6 operating system implementation

1. Andrew S. Tanenbaum, Herbert Bos, *Modern Operating Systems*, 4th ed., Prentice Hall (2015)
2. Thomas Anderson, Michael Dahlin, *Operating Systems: Principles and Practice*, 2nd ed., ISBN: 0985673524, Recursive books (2014)
3. Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau, *Operating Systems: Three Easy Pieces*, Arpaci-Dusseau Books (2015)