COMSATS University Islamabad
Department of Computer Science
Course Description Form (CDF)

Course Information	
Course Code: **CSC323**	Course Title: **Operating Systems**
Credit Hours: **3 (2, 1)**	Lecture Hours/Week: **2**
Lab Hours/Week: **3**	Pre-Requisites: **None**

Course Objective

- To discuss the services and the design of an operating system;
- To explain the structure and organization of the file system and memory management;
- To discuss what a process is and how processes are synchronized and scheduled as well as how access to system resources is managed;
- To present the use of system calls for managing processes, memory and the file system;
- To explain the data structures and algorithms used to implement an OS;
- To explain security and protection issues in computer systems;
- To use C and UNIX commands to develop various system programs under Linux to make use of OS concepts related to process synchronization, shared memory, mailboxes, file systems, etc.

Course Content

This course introduces the services and functions performed by operating system for smooth and accurate system operations. Topics include: Operating Systems Overview; Device Organization & System Operations; Operating Systems Principles; Process Management; Process Synchronization; Deadlocks; Multiprocessor Issues; Memory Management; Storage Management; and Security & Protection.

Unit wise Major Topics

Unit	Topic	No. of Teaching Hours
1.	Operating Systems: Overview, Purpose & Functionality, Evolution, Needs, Principles, Computing Environments; Device Organization & System Operations: Interrupts, Dual Mode Execution, Single & Multi User; Services & System Calls, Shell Management; and OS Structuring Techniques & Design Issues.	5
2.	Process Management: Concepts, States, Structures, Context Switching; Operations on Processes; IPC Issues; Threads: Parallelism & Concurrency; Scheduling & Dispatching: Types, and Algorithms;	8
3.	Process Synchronization: Primitives, Critical Section Problem & Solutions; Deadlocks: Characterization, and Handling.	6
4.	Memory Management: Physical Memory & Issues; Allocation Techniques: Contiguous & Non-Contiguous; Virtual Memory: Demand Paging, Working Sets, and Thrashing.	5
5.	Storage Management: Disk Management, Disk Scheduling, Disk Structure, Swap-Space Management, and File System & Implementation.	4
6.	Security & Protection: Overview, Significance, Policy/Mechanism Separation, Security Methods & Devices Protection, and Access Control & Authentication.	2
Total Contact Hours		**30**

Mapping of CLOs and GAs

Sr.#	Unit #	Course Learning Outcomes	Blooms Taxonomy Learning Level	GA
CLO's for Theory				
CLO-1	1	Elaborate concepts and principles of operating systems.	*Understanding*	2
CLO-2	2-3	Analyze various operations performed by operating system for process management.	*Analyzing*	2,3
CLO-3	4	Analyze the memory management issues and techniques in the context of operating system.	*Analyzing*	3
CLO-4	5	State the concepts of file system, storage and security issues.	*Understanding*	2
CLO's for Lab				
CLO-5	1	Operate basic services and functionality of operating systems.	*Applying*	2
CLO-6	1	Compose Linux commands using Shell scripting.	*Applying*	2,3
CLO-7	2-3	Implement the concepts of process management.	*Applying*	2,3

CLO Assessment Mechanism

Assessment Tools	CLO-1	CLO-2	CLO-3	CLO-4	CLO-5	CLO-6	CLO-7
Quizzes	Quiz 1	Quiz 2	Quiz 3	Quiz 4	-	-	-
Assignments	Assignment 1	Assignment 2	Assignment 3	Assignment 4	LAB Assignment	LAB Assignment	LAB Assignment
Mid Term Exam	Mid Term Exam	Mid Term Exam	-	-	Lab Mid Term Exam		-
Final Term Exam	Final Exam				Lab Project/ Final Term Lab Exam		

Text and Reference Books

Textbooks:
1. Operating System Concepts, Silberschatz & Galvin, Addison-Wesley, 2021.
2. Modern Operating Systems, Tanenbaum, A. S., Prentice Hall, 2014.

Reference Book:
1. Operating Systems: Internals and Design Principles, Stallings, W., Pearson, 2017.