Course Title: **Operating System (3 Cr.)**
Course Code: **CACS251**
Year/Semester: **II/IV**
Class Load: **6 Hrs. / Week (Theory: 3 Hrs, Tutorial: 1, Practical: 2 Hrs.)**

Course Description

This course includes the topics that help students understand operating system and it's functionality along with its types.

Course Objectives

The general objectives of this subject are to provide the basic feature, function and interface with the hardware and application software to run the computer smoothly.

Course Contents

Unit 1 Introduction to Operating System **2 Hrs.**

History, Introduction and Generation of Operating System, Objectives (Resource Manager and Extended Machine), Types of Operating system, Function of Operating system.

Unit 2 Operating System Structure **2 Hrs.**

Introduction, Layered System, Kernel, Types of Kernel (Monolithic/Macro Kernel and Micro / Exo-Kernel), Client-Server Model, Virtual Machines, Shell.

Unit 3 Process Management **15 Hrs.**

Process Concepts(3 Hrs.): Definitions of Process, The Process Model, Process States, Process State Transition, The Process Control Block, Operations on Processes (Creation, Termination, Hierarchies, Implementation), Cooperating Processes, System Calls (Process Management, File management, Directory Management).

Threads (1 Hr): Definitions of Threads, Types of Thread Process (Single and Multithreaded Process), Benefits of Multithread, Multithreading Models (Many-to-One Model, One-to-One Model, Many-to Many Model).

Inter-Process Communication and Synchronization(6 Hrs.): Introduction, Race Condition, Critical Regions, Avoiding Critical Region: Mutual Exclusion And Serializability; Mutual Exclusion Conditions, Proposals for Achieving Mutual Exclusion: Disabling Interrupts, Lock Variable, Strict Alteration (Peterson's Solution), The TSL Instruction, Sleep and Wakeup, Types of Mutual Exclusion (Semaphore, Monitors, Mutexes, Message Passing, Bounded Buffer), Serializability: Locking Protocols and Time Stamp Protocols; Classical IPC Problems (Dining Philosophers Problems, The Readers and Writers Problem, The Sleeping Barber's Problem)