COURSE OUTLINE

CSIT-01605: **Operating System** Course Instructor: **Muhammad Furqan**

Credit Hours: 3(2-1)

Pre-requisite: None

Course Objectives: This course examines the important problems in Operating System design and implementation. This course will introduce the core concepts of Operating Systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security.

Text Book: Operating System Concepts by Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, Wiley; 9th edition (December 17,2012). ISBN-10:1118063333

Reference Materials:

1. Operating Systems: Internals and Design Principles by William Stallings, Prentice Hall; 7th edition (March 10,2011). ISBN-10:013230998X
2. Modern Operating Systems by Tanenmaum A.S., Prentice Hall; 3rd Edition (2007). ISBN-13:978-0136006633

Lecture / Week	Course Contents
Week 1	**Overview:** Operating System basics Operating System Services **User Interface:** Command Line Interface Graphical User Interface **System Calls:** Definition, Types and working
Week 2	**OS Structure:** Simple, Layered, Micro Kernels, Modules **Virtual Machines:** Introduction, advantage and disadvantages, Kernel and Shells, System Boot
Week 3	**Processes:** Process State, Process State Diagram Process Control Block **Process Scheduling Types:** Short Term, Long Terms, Medium Term, Context Switching, Queuing Diagram

Week 4	**Process:** Operations on Processes (Process Creating, Process Termination) **Inter-Process Communication:** Message Passing and Share Variable
Week 5	**Threads:** Introduction, Difference with Processes, Multithreading Models (explanation with examples), Thread Libraries. User Threads VS kernel Threads
Week 6	**Process Scheduling:** Scheduling Criteria, Scheduling Mechanisms. **Types:** Preemptive VS Non Preemptive Scheduling
Week 7	**Scheduling Algorithm:** FCFS, SJF, Priority and Round Robing Comparison of all 04 algorithms Implementation
Week 8	**MID TERM**
Week 9	**Threads and Concurrency:** Concurrency through multi-threading, Concurrency through interrupt handling Concurrent access to shared memory, race conditions, mutual exclusion.
Week 10	**Synchronization:** Atomic instructions, Locks, Mutex semaphores, counting semaphores. **Classic Synchronization Problems:** Producer Consumer, Dining Philosophers, Readers and Writers.
Week 11	**Deadlock:** Overview and its prevention (Method and explanation) Recovery from Deadlock
Week 12	**Deadlock Avoidance (methods and explanation)** Recovery from Deadlock
Week 13	**Memory:** Swapping (overview) Segmentation (Overview and explanation)
Week 14	**Paging: Introduction and explanation**
Week 15	**Page Replacement Algorithms:** FIFO, LRU, Optimal
Week 16	**Final Term**