Course Outline

CSIT-21104: Operating Systems **Course Instructor: Aymen Khan**
Credit Hours: *3(2-1)*
Pre-Requisites: *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.
Pre-Requisites: None
Text Book:
1. *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; 7 edition (March 10, 2011). ISBN-10: 013230998X
2. *Modern Operating Systems* by Tanenmaum A.S., Prentice Hall; 3rd Edition (2007). ISBN-13: 978-0136006633

Course Outline: Mid Term **Week**	**Course Contents**
Week 1	**Overview:** Operating System basics, Operating System Services **User Interface:** Command Line interface, Graphical User Interface (GUI) **System Calls:** Definition, types and working
Week 2	**OS Structures:** Simple, Layered, Microkernels, Modules **Virtual Machines:** Introduction , advantages and disadvantages Kernel and shells, System Boot
Week 3	**Processes:** Process states, Process state diagram, Process Control Block **Process scheduling Types:** Short term, long term, medium term, context switching, Queuing diagram
Week 4	**Process:** Operations on Processes (process creation, process termination) **Inter-process Communication:** Message Passing and shared variable
Week 5	**Threads:** Introduction, difference with processes, Multithreading Models (explanation with examples), Thread Libraries. User Threads vs. kernel Threads
Week 6	**MID TERM**

CSIT-21104: *Operating Systems*
Credit Hours: *3(2-1)*

Pre-Requisites: *None* **Week**	**Course Contents**
Week 7	**Process Scheduling:** Scheduling criteria, scheduling mechanisms, **Types:** preemptive vs non-preemptive scheduling.
Week 8	**Scheduling Algorithms:** FCFS, SJF, Priority, and Round Robin. Comparison of all 4 algorithms
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 (Methods and explanation) Methods for Handling Deadlocks
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**