Course Title:	***Operating Systems***
Course Code:	CSC-320
Credit Hours Theory:	3
Credit Hours Lab (If Applicable):	1
Pre-requisite course	CS221
Instructor Name with Qualification:	Shaftab Ahmed
Course Objectives:	Operating System is the most important system component. It deals with many requests arriving from various directions asynchronously. It acts as an interface between the user and computer and shields the user from hardware complexities and provides the user with a virtual machine that is easy to program and use. The objectives of this course are as follows • To introduce students with the concepts of the designing and implementing the operating systems. • To understand the various areas of abstraction provided by an operating system for system users and programmers. • To learn the internal structure of modern operating systems, what problems must be overcome by an operating system and some of the techniques that have been used to solve these problems..
Course Learning Outcomes	Theory 1. To be able to understand the Operating Systems in detail in a platform independent form 2. To know the difference between an operating system and an application program, and what each is used for in a computer 3. To be able to understand the functions of Operating Systems software structures 4. Articulate data management including random access memory and file systems. 5. Articulate various input and output technology associated with operating systems. 6. Perform basic operating system maintenance and support.

	Practical skills 1. OS installation on bare-metal, Virtual machine 2. Basic shell scripting 3. Process concepts and implementation 4. File manipulation 5. Signal handling and Inter-process communication 6. Mutual exclusion concepts and implementation
Contents (Catalog Description):	**Introduction** Functions, characteristics and types of Operating Systems. Description of hardware and software layers comprising computer system **Process Management** Process concepts, Process creation/termination, Process life cycle, OS control structures, Use of Process control block PCB, Process Switching **Uni-processor and Multi Processor Scheduling** Types of scheduling, scheduling criteria, scheduling algorithms **Process synchronization** Introduction to mutual exclusion and critical sections the primitives for implementation of mutual exclusion **Deadlocks** Dead lock problem prevention, avoidance and recovery methods **Memory Management** Real and virtual memory organization techniques, Paging/Segmentation and address translation techniques, various Placement, fetch and replacements policies **File system Interface/Implementation** File concepts, access methods, directory structure ,free space management, allocation methods etc. **I/O management** (I/O performance parameter, Various I/O scheduling policies)
Recommended Text Books:	1. Silberschatz, Galvin, "Operating Sytems Concepts" 8th Edition, John Wiley, 2007
Reference Books:	1. William Stallings, "Operating Systems" 2. Harvey M. Deitel, "Operating Systems Concepts"
Helping Web Sites:	

General Instructions for students:	Use the course resources available in Yahoo group http://groups.yahoo.com/OSSpring2014 **Home Works and Assignments** • Attendance is mandatory. Every class is important. All deadlines are hard. Under normal circumstances late work will not be accepted. • 75% attendance is mandatory. Latecomers will be marked as absent. • Students are required to take all the tests. No make-up tests will be given under normal circumstances. Any form of cheating on exams/assignments/quizzes is subject to serious penalty **Quiz Tests** Week 3 Quiz 1 Week 5 Quiz 2 Week 7 Quiz 3 Week 9 Quiz 4 **Evaluation Criteria** Assignments/projects 20% Quizzes 10% Mid-Term 20% Final Exam 50%

Sixteen Week Lesson Plan	**Week # 1.**	**Introduction to Operating systems.** Hardware, Software, Firmware Program development i.e. source, compilation, linking and loading. System Evaluation.
	Week # 2.	**Operating Systems Structures** Polling and interrupt based device scheduling Virtual / Extended machines
	Week # 3.	**Process Concepts** Multitasking / Multiprogramming / Multithreading
	Week # 4.	**CPU Scheduling** Process management and scheduling policies
	Week # 5.	**CPU Scheduling (cont)** Multiprocessor / Multicore processor scheduling.
	Week # 6.	**Process Synchronization** Inter process communication, Concurrent processing, Critical sections Mutual exclusion and synchronization,
	Week # 7.	**Process Synchronization (cont)** Semaphores, Monitors etc.
	Week # 8.	**Deadlocks** Resource allocation and Deadlock management
	Week # 9.	**Mid Term Exam**
	Week # 10.	**Real Memory** Memory Management policies (Contiguous i.e. partitioned / Segmented) Paged memory systems for Real memory. Address translation mechanisms
	Week # 11.	**Virtual Memory** Virtual memory management, Page Removal Algorithms, Address translation mechanisms and cache management models / policies
	Week # 12.	**Virtual Memory (Cont)**

	Week # 13.	**File System** Access methods, Directory structure and protection
	Week # 14.	**Implementing file systems** File structure, Directory implementation, Allocation and free space management Disk space allocation strategies, File allocation table (FAT)
	Week # 15.	**Secondary Storage** Disk I/O management policies, buffered I/O
	Week # 16.	**Secondary Storage** (cont) Fault tolerance, backup and recovery mechanisms RAM disks, disk caching, Spooling devices etc.

Course Learning Outcomes mapping to Program Learning Objectives

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME LEARNING OUTCOMES													
SOFTWARE ENGINEERING		**Operating Systems**											
No.	**Program Outcomes**	**Course Learning Outcomes**											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Engineering Knowledge					√							
2	Problem analysis							√					
3	Design/Development of solutions							√					
4	Investigation							√					
5	Modern tool usage						√						
6	Engineer and society												
7	Environment and sustainability												
8	Ethics												
9	Individual and Team work							√					
10	Communication							√					
11	Project Management												
12	Lifelong learning							√		√			

Course Learning Outcomes mapping to Program Learning Objectives

CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME LEARNING OUTCOMES												
SOFTWARE ENGINEERING		**SOFTWARE PROJECT MANAGEMENT**										
No.	**Program Outcomes**	**Course Learning Outcomes**										
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1	Engineering Knowledge						√						
2	Problem analysis							√					
3	Design/Development of solutions							√					
4	Investigation							√					
5	Modern tool usage							√					
6	Engineer and society								√				
7	Environment and sustainability								√				
8	Ethics								√				
9	Individual and Team work									√			
10	Communication									√			
11	Project Management							√					
12	Lifelong learning									√			