University of Computer Studies, Yangon
D.C.Sc.
Operating System Concepts with Linux
Course Description

Course code number	CS-421 **First Semester**	Course Title	Operating System Concepts with Linux
Semester hours	1.5 hours	**No. of Credit Units**	3
Prerequisite	None	**Course Coordinator**	Dr. Kyar Nyo Aye

Course Description

This course is about the concepts, structure, and mechanisms of operating systems. Modern operating systems are complex and sophisticated. Presenting these concepts has been challenging, however fundamentals remain consistent. The intent of this course is to provide students with an opportunity to learn and discuss certain fundamentals of the operating system design, which depends on the current state of technology.

Learning Outcomes

Upon the successful completion of this course, students will be able to:
- An understanding of an operating system's objectives and functions, developments leading to modern operating systems, virtual machines, OS design considerations and modern operating systems
- An understanding of process and threads and the issues involving their management, communication and concurrency.
- An understanding of memory management, memory partitioning, paging, segmentation and the concept of virtual memory.
- An understanding of how multiprocessor scheduling works and its main issues.

Reference Books

- Operating Systems Concepts, 10th Edition, by Avi Silberschatz, Peter Baer Galvin and Greg Gagne
- Operating Systems: Internals and Design Principles, 7th Edition, by William Stallings
- Modern Operating Systems, 4th Edition, by Andrew S. Tanenbaum and Herbert Bos

Course Organization

Student participation in the course will involve the following activities:
1. Attending the lectures
2. Assignments
3. Tutorial
4. Moodle/Quiz
5. Practical
6. Exams

Assessment Plan for the Course

Paper Exam	50%
Tutorial	10%
Assignment	10%
Moodle Test/Quiz	10%
Practical	10%
Class Participation	10%

Period: **18 periods for 18 weeks (1 hour and 30 minutes for 1 period)**

No.	Chapter	Period	Detail Lecture Plan
1.	**Operating System Overview**	**1**	**Lectures + Assignment + Quiz**
	What Operating Systems Do Computer-System Organization Computer-System Architecture Operating-System Structure Operating-System Operations Resource Management Security and Protection Virtualization Distributed Systems		
2.	Accessing the Command Line Managing Files from the Command Line Getting Help in Linux Creating, Viewing, and Editing Text Files	**1**	**Lab + Assignment + Quiz**
3.	**Processes**	**1**	**Lectures + Assignment + Quiz**
	Process Concept Process Scheduling Operations on Processes Interprocess Communication		
4.	Monitoring and Managing Linux Process Managing Priority of Linux Processes Controlling Services and Daemons	**1**	**Lab + Assignment + Quiz**
5.	**CPU Scheduling**	**1**	**Lectures + Assignment + Quiz**
	Basic Concepts Scheduling Criteria Scheduling Algorithms Thread Scheduling Multiple-Processor Scheduling Real-Time CPU Scheduling		
6.	Managing Local Linux Users and Groups Controlling Access to Files with Linux File System	**1**	**Lab + Assignment + Quiz**
7.	**Process Synchronization**	**1**	**Lectures + Assignment + Quiz**
	Background The Critical-Section Problem Peterson's Solution Hardware Support for Synchronization Semaphores Monitors Classic Problems of Synchronization		
8.	Configuring and Securing OpenSSH Service Analyzing and Storing Logs Managing Linux Networking	**1**	**Lab + Assignment + Quiz**
9.	**Deadlocks**	**1**	**Lectures + Assignment + Quiz**
	System Model Deadlock Characterization Methods for Handling Deadlocks		

	Deadlock Prevention Deadlock Avoidance Deadlock Detection Recovery from Deadlock		
10.	Archiving and Copying Files Between Systems Installing and Updating Software Packages Accessing Linux File Systems	**1**	**Lab + Assignment + Quiz**
11.	**Main Memory**	**1**	**Lectures + Assignment + Quiz**
	Background Contiguous Memory Allocation Paging Structure of the Page Table Swapping		
12.	Using Regular Expressions with grep Creating and Editing Text Files with vim Scheduling Future Linux Tasks	**1**	**Lab + Assignment + Quiz**
13.	**Virtual Memory**	**1**	**Lectures + Assignment + Quiz**
	Background Demand Paging Copy-on-Write Page Replacement Allocation of Frames Thrashing		
14.	Controlling Access to Files with Access Control Lists (ACLs) Managing SELinux Security	**1**	**Lab + Assignment + Quiz**
15.	**File-System Interface**	**1**	**Lectures + Assignment + Quiz**
	File Concept Access Methods Directory Structure Protection Memory-Mapped Files		
16.	Adding Disks, Partitions, and File Systems to a Linux System Managing Logical Volume Management (LVM) Storage	**1**	**Lab + Assignment + Quiz**
17.	**File-System Implementation**	**1**	**Lectures + Assignment + Quiz**
	File-System Structure File-System Operations Directory Implementation Allocation Methods Free-Space Management		
18.	Controlling and Troubleshooting the Linux Boot Process Limiting Network Communication with firewall	**1**	**Lab + Assignment + Quiz**