SIR PADAMPAT SINGHANIA UNIVERSITY
Udaipur

COURSE PLAN

Name of the Course Teacher(s) : Harish Tiwari
Subject : Operating Systems
Branch : CTIS Semester: V Year: III
Course Code : CT-257 L-T-P-C: 3-0-2 *w.e.f. Jan 2020*

Learning Objectives:

The objective of this course is to cover the underlying concepts of Operating System. This Syllabus provides a comprehensive introduction of Operating System, Process Management, Memory Management, File Management, I/O management, Protection and Security issues and case study of various operating systems.

Lecture Plan

Sr. No.	Topics	Contact Hours (Lectures)
Introduction to Operating System: *(07 Lectures)*		
1.	Objectives & Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, system calls, System programs, Virtual Machines. System Structure, OS Kernel and Shell	4
2.	History of UNIX, Features & Benefits, Versions of UNIX, Features of UNIX File System, Commonly Used Commands & getting Started (Login/Logout) . Creating & viewing files using cat, file comparisons, View files, disk related commands, checking disk free spaces.	3
Process and Thread Management *(12 Lectures)*		
3.	Process: Concept of a Process, Process States, Process Description, Process Control Block, Operations on Processes	2
4.	Threads: Introduction to Threads, Types of threads, Single & Multi-threaded processes. Multicore processors and threads	2
5.	Types of Scheduling: Preemptive and Non-preemptive, Scheduling Algorithms: FCFS, SJF, SRTN, Priority based, Round Robin, Multilevel Queue scheduling. Introduction to Thread Scheduling, Multiprocessor Scheduling,	5
6.	Unix Process Management: The Structure of Processes: Process States & Transitions - Layout of system memory - Context of a process. Process Control: Process Creation – Signals – Process Termination – Invoking other programs – PID & PPID – Shell on a Shell.	3
Synchronization & Deadlocks *(09 Lectures)*		

7.	Concurrency: Principles of Concurrency, Inter-Process Communication, Process/Thread Synchronization. Mutual Exclusion: Requirements, Hardware Support, Operating System Support (Semaphores and Mutex), classical synchronization problems: Readers/Writers Problem, Producer and Consumer problem.	4
8.	Introduction to deadlock, System Model, Deadlock characterization, Methods for handling Deadlocks,	2
9.	Deadlock prevention, Deadlock Avoidance,	2
10.	Deadlock Detection, Recovery from Deadlock.	1
Storage Management *(11 lecture)*		
11.	Memory Management: Logical & physical Address Space, Memory Management Requirements, Memory Partitioning: Fixed Partitioning, Dynamic Partitioning, Memory Allocation Strategies: Best-Fit, First Fit, Worst Fit, Next Fit, Buddy System,	4
12.	Paging, Segmentation with Paging.	3
13.	Virtual Memory: Hardware and Control Structures, Demand Paging, Structure of Page Tables,	2
14.	Page Replacement Algorithms, Allocation of Frames, Thrashing,	2
File System *(06 Lectures)*		
15.	File concept, attributes and operations on files, Access Methods, Directory structure,	3
16.	File-System Implementation: File-System structure. Directory Implementation, Allocation Methods.	3
17.	The Unix File System: Inodes - Structure of a regular file – Directories - Conversion of a path name to an inode - Super block - Inode assignment to a new file - Allocation of disk blocks. System calls for the file System: Open, Read, Write, Lseek, and Close. File creation - Creation of special files, Changing directory & root - changing owner & mode – stat & fstat - pipes - Dup - Mounting & Un mounting file systems - Link & Un link.	3
Disk Management *(03 Lectures)*		
18.	Introduction to secondary storage, Disk Structure, Disk Scheduling algorithm: FCFS, SSTF, SCAN, CSCAN, LOOK, C- LOOK. Disk Management, Disk Cache	3
Protection and Security *(04 Lectures)*		
19.	Protection: Goals of Protection, Domain of Protection,	2
20.	Security: Security Problem, User Authentication, One – Time Password, Program Threats, System Threats.	2
Unix System Administration *(04 Lectures)*		
21.	Common administrative tasks, identifying administrative files configuration & log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions & ownerships, Creating & managing groups,	2

	modifying group attributes, Temporary disabling of user's accounts	
22.	Creating & mounting file system, checking & monitoring system performance - file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel, installing & removing packages with rpm command	2
Total Lectures		**56**

Flipped Classroom Activity: Topic: CPU Scheduling Algorithm

Flipped Classroom activity 1(FC-1)
Outside Class activity:
The video resources provided to the students for the flipped classroom activity.

S.No	Video resource	Topics covered
1	http://nptel.ac.in/courses/106106144/19	CPU Scheduling

In class Activity:

1. Discussion on CPU scheduling algorithms.
2. Explanation of Algorithms with Animation.
3. A quiz would be organized to understand the CPU scheduling algorithms.
4. Final answer would be explained by teacher.

Think-Pair-Share (TPS): Discussion about CPU Scheduling Algorithms.

a. **Think (10 min)** - Think and find out the solution of given problem using Specific algorithm.
b. **Pair (10 min)** - Discussion with another group and combine the solution solved with different algorithm.
c. **Share (5 min)** - Students will present his/her solution to the class and final comparison among all algorithms' solution would be combined to make comparison study.

Evolution Criteria for the students:

(A) FOR THEORY COURSES

Sr. No.	Assessment	Weightage (in %)
1.	Mid Term Examination – I and II	35 (17.5 % Each)
2.	Quiz (Best 3 out of 4)	15 (5 % Each)
3.	S & GD/Active Learning & Class Assignment	10
4.	Home Assignment	5
5.	Attendance	5
6.	End Term Examination	30

(B) FOR PRACTICAL COURSES

Sr. No.	Examination	Weightage (%)				
		Performance	Viva – Voce	File	Attendance	Total
1.	Mid Term Examination	20	10	-	-	30
2	End Term Examination	20	10	20	20	70

(C) EXAMINATION SCHEDUE

ACTIVITY	DATE	TIME
QUIZ 1	28-Jan-20	1:05 to 1:55 p.m.
ASSIGNMENT 1	18-Feb-20	1:05 to 1:55 p.m.
QUIZ 2	25-Feb-20	1:05 to 1:55 p.m.
QUIZ 3	31-Mar-20	1:05 to 1:55 p.m.
ASSIGNMENT 2	07-Apr-20	1:05 to 1:55 p.m.
QUIZ 4	16-Apr-20	3:45 to 4:35 p.m.

Recommended Books:

Text Book

1. Silberschatz, Galvin ,"Operating system", Willey Pub.

Reference Books

1. Tannanbaum, "Modern operating system",PHI Learning
2. System Programming – Dhamdhare
3. William stalling, "operating system" Pearson Edu.

Signature of the faculty

Name – Harish Tiwari

Signature of the HOD

Name- Prof. Divya Bhatnagar