

Savitribai Phule Pune University, Pune First year of MCA (2020 Course) 310915: Operating System		
Teaching Scheme: TH: 03 Hours/Week	Credit 03	Examination Scheme: Internal: 30 Marks External : 70 Marks
Prerequisite courses, if any: 1. 310902- Data structures and Algorithms Companion Course, if any: 1. 310918- Operating System laboratory Course Objectives: <ul style="list-style-type: none"> To introduce basic concepts and functions of modern operating systems To understand the concept of process and thread management. To understand the concept of concurrency control To understand the concept of disk scheduling and File management. To understand various Memory Management techniques To understand the features of LINUX operating system 		
Course Outcomes: On completion of the course, learner will be able to– CO1: Fundamental understanding of the role of Operating Systems. CO2: To understand the concept of a process and thread. CO3: To apply the concept of process scheduling. CO4: To apply the concept of process synchronization, mutual exclusion and the deadlock CO5: To realize the concept of disk scheduling and File system CO6: To understand the various memory management techniques.		
Course Contents		
Unit I	Overview of operating system	06 Hours
Operating System Objectives and Functions, The Evolution of Operating Systems, Developments Leading to Modern Operating Systems, Virtual Machines. BASH Shell scripting: Basic shell commands, shell as a scripting language.		
Unit II	Process description and control	06 Hours
Process: Concept of a Process, Process States, Process Description, Process Control (Process creation, Waiting for the process/processes, Loading programs into processes and Process Termination), Execution of the Operating System. Threads: Processes and Threads, Concept of Multithreading, Types of Threads Scheduling: CPU scheduling , Types of Scheduling, Scheduling criteria, Scheduling Algorithms		
Unit III	Concurrency control	06 Hours
Process/thread Synchronization and Mutual Exclusion: Principles of Concurrency, Requirements for Mutual Exclusion, Mutual Exclusion: Hardware Support-Semaphore and monitor Classical synchronization problems: Readers/Writers Problem, Producer and Consumer problem Deadlock : Principles of Deadlock, Deadlock Modelling, Strategies to deal with deadlock: Deadlock Prevention, Deadlock Avoidance, Deadlock detection and recovery		
Unit IV	Memory management	06 Hours
Memory Management: Memory Management Requirements, Memory Partitioning: Fixed		

Partitioning, Dynamic Partitioning, Buddy System, Relocation, Paging, Segmentation. Virtual Memory: Hardware and Control Structures.		
Unit V	Disk Scheduling and File Management	06Hours
Disk Scheduling(FIFO, SSTF, SCAN, C-SCAN, LOOK, C-LOOK), Disk structure. File Management: Overview, File Organization and Access, Allocation methods, File Directories, File Sharing, Free space management.		
Unit VI	The LINUX Operating System	06 Hours
Linux Design Principles, Linux Booting Process, Kernel Modules, Process Management, Scheduling, Memory Management, File Systems, Input and Output, Inter-process Communication		
Learning Resources:		
Text Books: <ol style="list-style-type: none"> 1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, ISBN-10: 0-13-380591-3, ISBN-13: 978-0-13-380591-8, 8th Edition 2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, WILEY, ISBN 978-1-118-06333-0 , 9th Edition 3. Andrew S. Tanenbaum & Herbert Bos, Modern Operating System, Pearson, ISBN-13: 9780133592221, 4th Edition 		
Reference Books: <ol style="list-style-type: none"> 1. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, ISBN-10: 0596009526, ISBN-13: 978-0596009526 2. Harvey M. Deitel, Operating Systems, Prentice Hall, ISBN-10: 0131828274, ISBN-13: 978-0131828278 3. Thomas W. Doeppner, Operating System in depth: Design and Programming, WILEY, ISBN: 978-0-471-68723-8 4. Mendel Cooper, Advanced Shell Scripting, Linux Documentation Project 		
e-Books: <web links> <ol style="list-style-type: none"> 1. https://www.getfreebooks.com/xv6-a-simple-unix-like-teaching-operating-system/ 2. https://www.pdfdrive.com/operating-systems-e18726938.html 		
MOOC Courses: <web links> <ol style="list-style-type: none"> 1. https://www.coursera.org/courses?query=operating%20system 2. https://www.classcentral.com/tag/operating-systems 3. https://www.udacity.com/course/introduction-to-operating-systems--ud923 		