COURSE FILE

For

Operating System (ECSE204L)

Faculty Name: Dr. Shyam Singh Rajput, Dr. Suchi Kumari,
Dr. Tanveer Ahmed

Course Type : Core

Semester and Year: IV Semester and II Year

L-T-P : 3-1-2

Credits : 5

Department : Computer Science Engineering

Course Level : UG

SCHOOL OF ENGINEERING AND APPLIED SCIENCES

Department of Computer Science Engineering

Bennett University
Greater Noida, Uttar Pradesh

Bennett University

Course Details:

Course Name:	**Operating System**	**Course Code:**			**ECSE204L**
Department:	**Computer Science Engineering**	**Type:**			**Core**
L-T-P Structure	**3-1-2**	**Credits**	**5**	**Pre-requisite:**	**ECSE201L**
Course Objectives	This course helps the students to understand, how the computer resources like CPU, memory, I/O devices, etc. are managed by the operating system. The learners will also become familiar with the modern concepts of distributed operating system and virtualization.				
Course Outcome	**At the end of the course, the students will be able to:** 1. Explain the structure and the services provided by the Operating System. 2. Identify the methods of synchronization and algorithms for scheduling processes and files. 3. Relate with the concepts of modern operating system and analyse the data centre technologies.				
Course Contents:	**Topics**				**No. of Hours**
	Introduction to Operating Systems: Definition, Components, Abstraction, OS design principles, OS Services, OS protection boundary, Monolithic OS, Modular OS, Microkernel.				3
	Processes and Process Management: Process Address Space, Process Execution State, Process Control Block, How is PCB Used, Context Switch, Process Life Cycle, Role of CPU Scheduler, Process Vs. Thread,				3
	Benefits of Multithreading and Issues on multiple CPUs, Basic Thread mechanics, Kernel Vs User level threads, Multithreading models,				3
	Multithreading Patterns: Boss/Worker Variants, Pipeline Pattern, Layered Pattern. Interrupts as threads, threads as signal handling, Forms of Message Passing.				3

	Scheduling: ***Traditional scheduling****:* Run to completion Scheduling, Preemptive and Non-Preemptive Scheduling, Timesharing and Time Slices.	3
	CPU Bound Timeslice Length, I/O Bound Time Slice Length, Run-Queue Data structure, Scheduling with Hardware Counters, multilevel feedback queue scheduling algorithm.	3
	Multiprocessor scheduling: Time sharing, space sharing, gang scheduling algorithms**.** ***Inter Process Communication****:* Critical Section structure.	3
	Synchronization Constructs, Spinlocks, semaphores, Reader Writer Locks, Monitors, Dining-Philosophers problem.	3
	reader writer problem, producer-consumer problem, **Deadlock:** definition, condition, resource allocation graph.	3
	Methods for handling deadlock: prevention, avoidance, deadlock detection and recovery**, Memory and I/O Management:** Introduction	3
	Memory Allocation Techniques: Fragmentation, Segmentation. Secondary memory management: Structure and scheduling algorithm, I/O File Management.	3
	Distributed Systems: Introduction: Remote Services, benefits, requirements, structure of RPC, Interface Definition Language, Marshalling, Unmarshalling, Pointers in RPCs, Handling Partial Failures, SunRPC and XDR, Distributed File Systems: Stateless Vs Statefull File Server,	3
	File Vs. Directory Service, Replication and Partitioning, Networking File System, Sprite Distributed File System, **Distributed Shared Memory:** Sharing Granularity, DSM Design Access Algorithm, DSM Design Migration Vs Replication, DSM Architecture, Indexing Distributed State, Consistency Model, Strict Consistency, Sequential Consistency, Causal Consistency, Weak Consistency.	3
	Cloud Computing and Virtualization: Internet Services Architecture, Homogeneous architectures, Hetrogeneous architectures, Cloud Computing Requirements, Cloud Enabling Technologies, Virtualization Models, Processor Virtualization, Para Virtualization, Memory Virtualization, Device Virtualization, Hypervisor Direct Model, Split Device driver model, Hardware virtualization.	3
Lab Work	Students will gain practical experience with the implementation and use of operating system functions such as process management, inter-process communication, process synchronization, memory management and file systems etc.	

	Moreover, students will have exposure to the tools for measuring and monitoring of operating systems related parameters and services.
Text Book:	**1.** Silberschatz, A., Galvin, P.B. and Gagne, G., Operating System Concepts, John Wiley
References:	1. Tanenbaum, Modern Operating Systems 2. Stallings, Willam, Operating Systems Internals and Design Principles, Prentice Hall.

Evaluation Components:

Components of Course Evaluation	Percentage
Mid Term Examination	20
End Term Examination	40
Lab Continuous Evaluation	10
End Term Lab Examination	20
Quiz-01	05
Quiz-02	05