SCHOOL OF COMPUTER ENGINEERING
KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY
DEEMED TO BE UNIVERSITY
BHUBANESWAR

***Course**: Operating System (Credits 3) (L-T-P) (3-0-0)*
***Course Code**:CS20002*
***Session**: Spring, 2025*

***Course Outcomes**:*

1. Able to understand the difference between different types of modern operating systems, virtual machines and their structure of implementation and applications.
2. Able to understand the difference between process & thread, issues in the scheduling of user-level processes/threads.
3. Able to understand and analyze the use of locks, semaphores, monitors for synchronizing multiprogramming / multithreaded systems and design solutions for multithreaded programs.
4. Able to understand the concepts of deadlock in operating systems and how they can be managed/avoided.
5. Able to understand the design and management concepts along with issues and challenges of main memory, virtual memory, and file system.
6. Able to understand the types of I/O management, disk scheduling, protection and security problems faced by operating systems and how to minimize these problems.

Module name	Topic/Coverage	No. of lectures	Days
Introduction	• Introduction to OS • Operating system structure	3	Day 1
	• Types of OS ◦ Batch OS ◦ Multiprogramming, multitasking OS ◦ Multithreading, Multiprocessing System ◦ Distributed OS, Network OS ◦ Real-Time OS		Day 2 Day 3

Process	● Process description ● Process States (5-state model, 7 State model) ● Contents of PCB	6	Day 4
	● Process scheduling ◦ Scheduling Queue ◦ Process schedulers (LT , ST and MT) ◦ Context switching ◦ Multithreading and their functionality.		Day 5
	● CPU scheduling criteria ● CPU scheduling algorithms ◦ FIFO ◦ SJF, SRTN		Day 6
	◦ Priority ◦ Round Robin		Day 7
	◦ HRRN ◦ Multi-level feedback scheduling ◦ Multi-level feedback queue scheduling		Day 8
	● Comparative Analysis of the CPU scheduling algorithms		Day 9
Activity	Activity 1	1	Day 10
Concurrent Process	● Race Condition ● Process Synchronization	6	Day 11
	● Critical section problems ● Requirements for a solution to critical section problems		Day 12
	● 2-process software solutions (Peterson Solution) ● Semaphore ● Lock.		Day 13
	● Classical problems of synchronization ◦ Producer-Consumer Problem ◦ Reader Writer Problem		Day 14
	◦ Dining Philosopher Problem ◦ Disadvantages of Semaphore		Day 15
	● High-level synchronization tools ◦ Critical region ◦ Introduction to Monitor		Day 16
Activity	Activity 2	1	Day 17
Deadlock	● Deadlock ● Handling deadlock (Resource Allocation Graph (RAG))	4	Day 18
	● Deadlock ignorance ● Deadlock prevention		Day 19
	● Deadlock avoidance (Banker's Algorithm) ● Deadlock detection and recovery		Day 20

			Day 21
Activity	Activity 3	1	Day 22
	MID SEMESTER		
Memory Management	• Address binding • Logical and physical address	8	Day 23
	• Memory management using partitioning o Fixed Partitioning, Drawbacks o Dynamic Partitioning, Drawbacks		Day 24
	• Virtual Memory: ◦ Translation look-aside buffers (TLBs) ◦ Hierarchical paging ◦ Inverted Page Tables		Day 25
	◦ Paging ◦ Segmentation ◦ Segmentation with Paging		Day 26
	◦ Demand Paging ◦ Dealing with Page faults		Day 27
	• Page replacement algorithms: ◦ First-In-First-Out(FIFO) ◦ Optimal Page Replacement (OPT)		Day 28
	◦ Least Recently Used (LRU) ◦ Most Recently Used (MRU)		Day 29
	• Thrashing		Day 30
Activity	Activity 4	1	Day 31
File Management	• File concept • Access Methods • Directory structure.	3	Day 32
	• File system mounting • File System structure		Day 33
	• File system Implementation • Allocation methods • Free space management		Day 34
I/O Management	• I/O Devices • Device controller • Device Drivers • Application I/O Interface	2	Day 35
			Day 36
Activity	Activity 5	1	Day 37

Disk Management	● Disk Structure ● Disk Scheduling ◦ FCFS ◦ SCAN	2	Day 38
	● Disk Scheduling ◦ C-SCAN ◦ LOOK ◦ C-LOOK		Day 39
OS protection and security	● Domain of Protection ● Access matrix	1	Day 40
	● Implementation of Access matrix ● System security		

* The Total number of classes is approx 40, which includes lectures and activities.

Text Book: Abraham Silberschatz, Peter B. Galvin, and Greg Gagne, "Operating System Concepts", 10th edition, Wiley Publisher, May-2018.

Reference book:

1. William Stallings, "Operating Systems: Internals and Design Principles", 9th edition, Published by Pearson, July 2021.
2. Deitel, Deitel, and Choffnes, "Operating Systems-Part I", 3rd Edition, Published by Pearson, 2004.

Teaching Pedagogy: Whiteboard/Marker, PowerPoint Presentations, Web Resources

Web References:

1. http://faculty.cs.tamu.edu/bettati/
2. http://u.cs.biu.ac.il/ ariel/download/os288/ppts/
3. http://www.cs.rutgers.edu/pxk/416/index.html
4. http://www.tutorialspoint.com/operating_system/os_multi_threading.htm
5. http://cs.nyu.edu/courses/spring02/V22.0202-002/class-notes.html

Evaluation Scheme

Assessment Methodology: Mid Term: *20*; End Term: *50*

Distribution of Internal Marks:- Total 50 Marks

Mid Semester Examination = 20 Marks

Activity-based assessment=30 Marks

i. Assignments/quizzes/Activities (20 Marks)
ii. Class Participation (10 Marks)

Activity-based assessment includes Problem Solving, Critical Thinking, Creation along with Quiz which should cover all the COs.

Course Coordinator
Spring, 2025