



COURSE HANDOUT

Session: 2025-2026

Sub Session: Semester II (Jan-Jun)

Course Name: Operating System (CS 211)

L/T/P/C: 3/0/2/4

Course Incharge: Mr. Kumar Nitesh

Course Faculty:

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Registered Batches:

B.Tech. - CSE 2020 , CSE 2022 , CYS 2022 , AI and DS 2024 , CSE 2024 , CYS 2024

Course Description

This course provides an introduction to different fundamental aspects of Operating Systems. The course covers the operating system structure, their major components and organization as well as the underlying architectural support. The main prima face of the course is given on the concepts of multi-programming, multi-tasking, multiprocessing, time-sharing, processes, threads, their synchronization, scheduling and management, concurrency control and underlying issues of deadlock, memory management, virtual memory, page replacement algorithms and file management system. The entire course is supported through illustrated examples. Some introduction is also provided to the concepts of networking, distributed systems and different security issues.

Course Outcomes

S.No.	Description
CO1	Understand the fundamental concepts and structure of operating systems, including system calls, OS services, and kernel architectures.
CO2	Analyse process and thread management mechanisms such as CPU scheduling, synchronisation, deadlocks, and inter-process communication.
CO3	Apply memory management techniques—including paging, segmentation, virtual memory, and page replacement algorithms—to solve performance-related problems.
CO4	Examine file system organisation, disk scheduling, and I/O management techniques used in modern operating systems.
CO5	Analyse protection, security, and resource management policies in operating systems with respect to efficiency, reliability, safety, and other performance metrics.

Course outcome mapping with Programme Outcomes:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	1	2	3	1	2	2	2	1	2
CO2	3	2	3	2	2	3	1	2	3	2	1	2
CO3	2	3	3	2	2	2	1	2	2	2	2	2
CO4	3	3	3	2	2	2	1	2	3	2	2	2
CO5	3	3	3	2	2	2	1	2	3	2	1	1
Max.	3	3	3	2	2	3	1	2	3	2	2	2

3 is High, 2 is Moderate, 1 is Low & - is Not Applicable

AC Approved Course Content

The Academic Council approved course content will be filled in this section by the Academic Office.

Tentative Lecture Plan/ Activities

Units	Syllabus Details	Hours required to complete	Course Outcome
1	Introduction	3	CO1
2	Process Management	2	CO1, CO2
3	InterProcess Communication	1	CO1, CO2
4	Threads using Fork	2	CO1, CO2
5	I/O Management	1	CO1, CO2
6	CPU Scheduling introduction	1	CO1, CO2, CO3
7	CPU Scheduling Algorithms	3	CO1, CO2, CO3, CO5
8	Deadlock management Introduction	1	CO1, CO2
9	Deadlock Characteristics, Handling and Detection	2	CO1, CO2, CO4
10	Deadlock Prevention and Avoidance	2	CO1, CO2, CO4
11	Deadlock Recovery	1	CO1, CO2, CO4
12	Process Synchronization Introduction	3	CO1, CO2
13	Process Synchronization	3	CO1, CO2, CO3
14	Process Synchronization Algorithms	3	CO1, CO2, CO3
15	Semaphores and monitors	3	CO1, CO2, CO3, CO4
16	Classical Problems of Semaphores	2	CO1, CO2, CO4
17	Device Management	2	CO1, CO2, CO4
18	Memory Management	2	CO1, CO3, CO4
19	Memory Management algorithms	2	CO1, CO3, CO4
20	File Management	1	CO1, CO3, CO4, CO5
21	Protection and Security 1	1	CO1, CO3, CO5
22	Revision	1	CO1, CO3, CO5
Total lectures/activities required		42*	
*Number of lectures/activities may vary.			

Book Details

Text Books

Reference Books

- Operating Systems: Internal and Design Principles, W. Stallings, Prentice Hall, 7th edition, ISBN-10: 9332518807
- Operating Systems A Concept Based Approach, D. M. Dhamdhere, McGraw Hill, 3rd edition, ISBN-10: 1259005585.
- The Design of the UNIX Operating System, M. J. Bach, Prentice Hall, 1st edition, ISBN-10: 9332549575.
- Principles of Operating Systems, N. Chauhan, Oxford University Press, 1st edition, ISBN-10: 0198082878.

Online course work/ Massive Open Online Course/ Open source web material

to be updated

Evaluation Scheme (Theory/ Practical)

Evaluation Component	Exam Month	Exam Duration (in Hrs)	Mode of Examination	Weighted Marks
Attendance	Not Applicable	Not Applicable	Not Applicable	10.00
Mid Semester Examination	March	1.5	Pen-Paper with closed book	20.00
Comprehensive Examination	May	3	Pen-Paper with closed book	40.00
Lab Assignment	Not Applicable	Not Applicable	Not Applicable	15.00
Quiz 1	February	0.5	Pen-Paper with closed book	5.00
Quiz 2	April	0.5	Online with closed book	10.00

Mode of Practical Exam

This component will be continuously evaluated. All lab assignment are required to be executed and submitted within the given time period.

Additionally there will be a Viva-Voce.

List of Tentative Practical

1. Basics of UNIX commands.
2. Shell programming
3. Implementation of CPU scheduling.
 - i. Round Robin
 - ii. SJF
 - iii. FCFS
 - iv. Priority
4. Implement all file allocation strategies
5. Implement Semaphores
6. Implement of File Organization Techniques
7. Implement Bankers algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement the all page replacement algorithms
 - i. FIFO
 - ii. LRU
 - iii. LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique for memory management.
12. Implement Threading & Synchronization Applications
13. Designing a basic OS

Course outcome mapping with evaluation components:

CO	Comprehensive Examination	Lab Assignment	Mid Semester Examination	Quiz 1	Quiz 2
CO1	2	2	3	3	2
CO2	3	2	2	2	3
CO3	3	2	1	2	3

CO5	1	1	2	2	2
Max.	3	2	3	3	3

3 is High, 2 is Moderate, 1 is Low & - is Not Applicable

Make up Policy

Students who are likely to miss a component of evaluation due to any genuine reason may be given a make-up for that component by the Course In-Charge. The students are required to approach the Course In-Charge immediately for the same before the conduct of the evaluation component. It is the responsibility of the student to approach the Course In-Charge. The Course In-Charge will not allow makeup, if a student approaches 7 days after the evaluation component (Student Handbook R 35).

Plagiarism

We are committed to uphold the standards of academic integrity and honesty. Plagiarism in any form is unacceptable and will be treated seriously (Student Handbook R 49).

Grading Policy

The marks obtained in all evaluation components will be aggregated, and the total will be converted into a letter grade or report in accordance with NIIT University's guidelines. Grading is relative and is generally aligned with the class average. Mid-Semester grades will be announced after the evaluation of the Mid-Semester Examination, as outlined in the Student Handbook (R 40 and R 41).

University Attendance Policy

As per attendance policy of NIIT University. For more details, kindly refer to the attendance policy in the student handbook.

Consultation Hours

The student may approach the course-in-charge for any clarification of their difficulties during the day time only. The students are free to approach on mail and fix discussion time which will be made available as per mutually available slots. This facility would be available to students who maintain at least 75% attendance for the course. Students who frequently miss lectures/practical sessions for any reasons and later expect a consultation time for the same would absolutely NOT be entertained.