

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING - DATA SCIENCE

COURSE MODULE FOR THE SESSION 2026-27 (ODD SEMESTER)

Course Syllabi with CO's

Academic Year: 2026 - 2027							
Department: Computer Science & Engineering - Data Science							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
1BCS304	Operating Systems	Core	Fundamentals of computer hardware and software	3	-	-	42T
Topics Covered as per Syllabus							
Module -1 Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management. Operating System Services: User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure.							
Module -2 Process Management: Process concept; Process scheduling; Operations on processes; Inter process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Thread scheduling; Multiple-processor scheduling,							
Module -3 Process Synchronization: Background, The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock.							
Module -4 Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing.							

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING - DATA SCIENCE

Module - 5

File System: File system: File concept; Access methods; Directory and Disk structure; File system mounting; File sharing;

Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.

Mass storage structures: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management;

TextBooks:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles, 9th edition, Wiley-India, 2015.

Reference Books

1. Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6th Edition
2. D.M Dhamdhare, Operating Systems: A Concept Based Approach 3rd Ed, McGraw- Hill, 2013.
3. William Stallings Operating Systems: Internals and Design Principles, 6th Edition, Pearson.

Web links and Video Lectures (e-Resources):

1. Introduction to Operating System: <https://youtu.be/mXw9ruZaxzQ>
2. Different Types of Operating Systems: <https://youtu.be/vBURt97EkA3>
3. Process Synchronisation in Operating System: https://www.youtube.com/watch?v=783KAB-tuE4&list=PLIemF3uozcAKTgsCIj82voMK3TMR0YE_f
4. Introduction to Unix: <https://infyspringboard.onwingspan.com/web/en/login>

Course outcomes: The students should be able to:

- Course outcomes (Course Skill Set): At the end of the course, the student will be able to:
- CO 1. Recall the structure, functions, and services of an operating system.
- CO 2 Explain process management concepts, CPU scheduling algorithms, and process synchronization mechanisms.
- CO 3. Apply appropriate CPU scheduling algorithms and process synchronization techniques to solve operating system problems.
- CO 4. Apply memory management techniques and deadlock-handling strategies to ensure efficient resource utilization.
- CO 5. Explain file system organization and secondary storage management techniques.
- CO 6. Describe information protection mechanisms, security principles, and access control methods in operating systems.

Continuous Internal Evaluation CIE [25+25=50 marks]

Continuous Comprehensive Assessments (CCA) 25 Marks + [Internal Assessment(IA): 25 (3 Session Tests are conducted during the semester and

Marks allotted based on average of best two performances)]

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING - DATA SCIENCE

Continuous Comprehensive Assessments (CCA)+ Internal Assessment Test (IA) = Continuous Internal Evaluation CIE [25+25=50 marks]

A minimum of **two Internal Assessment Tests (IA)** shall be conducted, carrying a total of **25 marks**.

In addition, **Continuous Comprehensive Assessment (CCA)** shall be conducted for a total of **25 marks**.

It is recommended to include **a maximum of two learning activities** as part of the CCA to foster the **holistic development of students**. These activities shall be:

Implementation of Operating System Concepts using C Programming List of

Problems:

1. Develop a C program to implement the Process system calls (fork (), exec(), wait(), create process, terminate process)
2. Simulate the following CPU scheduling algorithms to find the turnaround time and waiting time
 - FCFS b) SJF c) Round Robin d) Priority.
3. Develop a C program to simulate producer-consumer problem using semaphores.
4. Develop a C program that demonstrates interprocess communication between a reader process and a writer process. Use mkfifo, open, read, write, and close APIs in your program.
5. Develop a C program to simulate Banker's Algorithm for Deadlock Avoidance.
6. Develop a C program to simulate the following contiguous memory allocation techniques:
 - Worst fit b) Best fit c) First fit.
7. Develop a C program to simulate page replacement algorithms:
 - FIFO b) LRU
8. Simulate following file organization techniques:
 - Single level directory b) Two level directory
9. Develop a C program to simulate the linked file allocation strategies.
10. Develop a C program to simulate SCAN disk scheduling algorithm.

Note: At the end of the course, the students need to submit the report on conduction of the activity with relevant data to the course instructor. Evaluation is for 25 marks.

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code	1BCS304			Title: Operating Systems								
List of Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Total
CO-1	3	2	2	-	-	-	-	-	-	-	-	7
CO-2	3	2	2	-	-	-	-	-	-	-	-	7
CO-3	3	2	2	-	-	-	-	-	-	-	-	7
CO-4	3	2	2	-	-	-	-	-	-	-	-	7
CO-5	3	2	2	-	-	-	-	-	-	-	-	7
CO-6	3	2	2	-	-	-	-	-	-	-	-	7
Total	18	12	12									42

Note: 3 = Strong Contribution 2 = Average Contribution 1 = Weak Contribution - = No Contribution

The Correlation of Program Specific Outcome's (PSO's) and Course Outcome (CO's)

Subject Code	1BCS304	Title: Operating Systems	
List of Course Outcome's	PSO1	PSO2	Total
CO-1	3	-	3
CO-2	3	-	3
CO-3	3	-	3
CO-4	3	-	3
CO-5	3	-	3
CO-6	3	-	3
Total	18	-	18

