

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING - DATA SCIENCE

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

Course Syllabi with CO's

Academic Year: 2025 - 2026							
Department: Computer Science & Engineering (Data science)							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
1BCS305	Data Structures And Applications	Core	Basics of C Programming Concepts	3	0	0	42
Topics Covered as per Syllabus							
Module -1 Introduction: Data Structures, Classifications (Primitive & Non-Primitive). Pointers and Dynamic Memory Allocation, Arrays, Dynamically Allocated Arrays, Structures and Unions, Polynomials. Sparse Matrices: Sparse Matrix Representation and Transposing a Matrix. Textbook: Chapter-1 (1.2), Chapter-2 (2.1-2.4, 2.5.2, 2.5.3), Reference Book-1 (1.3)							
Module -2 Stacks: Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays, Stack Applications: Polish notation, Infix to Postfix Conversion, Evaluation of Postfix Expression. Queues: Definition, Array Representation, Queue Operations. Textbook: Chapter-3 (3.1-3.3, 3.6)							
Module -3 Circular Queues, Circular queues using Dynamic arrays, Multiple Stacks and Queues. LINKED LISTS: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Sparse Matrices: Sparse Matrix Representation, Doubly Linked List. Textbook: Chapter-3 (3.4, 3.7), Chapter-4 (4.1 to 4.3, 4.5, 4.7.1, 4.8)							
Module -4 Trees: Introduction-Terminology, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals – preorder, Inorder, postorder, Threaded Binary Trees. Binary Search Trees – Definition, Searching, Insertion, Deletion, Counting Binary Trees. Textbook: Chapter-5 (5.1.1, 5.2, 5.3.1-5.3.3, 5.5, 5.7.1- 5.7.4, 5.11.1)							
Module -5 GRAPHS: The Graph Abstract Data Types, Elementary Graph Operations. HASHING: Introduction, Static Hashing, Dynamic Hashing. PRIORITY QUEUES: Single and double ended Priority Queues, Leftist Trees. Textbook: Chapter 6 (6.1, 6.2), Chapter 8 (8.1 to 8.3), Chapter 9 (9.1, 9.2)							
TextBooks:							

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1. Ellis Horowitz, Sartaj Sahni, and Susan Anderson-Freed, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2023.

Reference Books

1. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed., McGraw-Hill, 2014.
2. Aaron M Tenenbaum, Data Structures using C, Pearson Education, 2019.
3. Reema Thareja, Data Structures Using C, 3rd Ed., Oxford Press, 2012.

List of URL's

1. Introduction to Data Structures:
<https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F&index=1>
2. Stacks:
<https://www.youtube.com/watch?v=g1USSZVWDsY&list=PLBF3763AF2E1C572F&index=2>
3. Queues and Linked Lists:
<https://www.youtube.com/watch?v=PGWZUgzDMYI&list=PLBF3763AF2E1C572F&index=3>
4. Trees:
<https://www.youtube.com/watch?v=tORLeHHtazM&list=PLBF3763AF2E1C572F&index=6>
5. Hashing:
<https://www.youtube.com/watch?v=KW0UvOW0XIo&list=PLBF3763AF2E1C572F&index=5>
6. Infosys Springboard: Data Structures & Algorithms using C++, C and Python – 2026:
<https://infyspringboard.onwingspan.com/>
7. Virtual Labs: Computer Science and Engineering - Data Structures-1: <https://ds1-iiith.vlabs.ac.in/>

Course outcomes: The students should be able to:

At the end of the course, the student will be able to :

1. Recall the fundamental concepts, terminology, and characteristics of various data structures.
2. Explain the principles, representation, and operations of linear and non-linear data structures.
3. Implement different primitive data structures, their operations, and primitive applications.
4. Choose a suitable data structure to solve computational and real-world problems.
5. Make use of hashing techniques and leftist trees to organise the data effectively.

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 in the CCA to foster students' holistic development

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

Subject Code	1BCS305			Title: Data Structures And Applications									
List of Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	Total	
CO-1	3	2	1	-	-	-	-	-	-	-	-	6	
CO-2	3	2	2	1	-	-	-	-	-	-	-	8	
	3	2	3	2	2	-	-	-	1	-	-	13	
CO-4	3	3	3	2	2	-	-	-	1	1	1	16	
CO-5	3	2	3	2	2	-	-	-	1	-	1	14	
Total	15	11	12	7	6	-	-	-	3	1	2	57	

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

Subject Code	1BCS305	Title: Data Structures And Applications	
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
Total	15	-	15

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