

**COURSE MODULE OF THE SUBJECT TAUGHT FOR THE SESSION 2023-24**  
**(ODD SEM)**

## Course Syllabus with CO's

Faculty Name: Arjun G S			Academic Year: 2023- 2024				
Department: Computer Science & Design							
Course Code	Course Title	Core/Elective	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BCS304	Data Structure and Applications	Core	Basics of C programming concepts	3	2	-	50
Course objective	<ol style="list-style-type: none"> <li>1. Explain the fundamentals of data structures and their applications essential for implementing solutions to problems.</li> <li>2. Illustrate representation of data structures: Stack, Queues, Linked Lists, Trees and Graphs.</li> <li>3. Design and Develop Solutions to problems using Arrays, Structures, Stack, Queues, Linked Lists.</li> <li>4. Explore usage of Trees and Graph for application development.</li> <li>5. Apply the Hashing techniques in mapping key value pairs.</li> </ol>						
Topics Covered as per Syllabus							
<b>Module-1</b> Introduction: Data Structures, Classifications (Primitive & Non-Primitive), Data structure operations (Traversing, inserting, deleting, searching, and sorting). Review of Arrays. Structures: Array of structures Self-Referential Structures. Dynamic Memory Allocation Functions. Representation of Linear Arrays in Memory, dynamically allocated arrays and Multidimensional Arrays. Demonstration of representation of Polynomials and Sparse Matrices with arrays.							
<b>Module-2</b> <b>Stacks and Queues</b> Stacks: Definition, Stack Operations, Array Representation of Stacks, Stacks using Dynamic Arrays. Different representation of expression. Stack Applications: Infix to postfix conversion, Infix to prefix conversion, evaluation of postfix expression, recursion. Queues: Definition, Array Representation of Queues, Queue Operations, Circular Queues, Queues and Circular queues using Dynamic arrays, Dequeues, Priority Queues.							
<b>Module-3</b> Linked Lists: Definition, classification of linked lists. Representation of different types of linked lists in Memory, Traversing, Insertion, Deletion, Searching, Sorting, and Concatenation Operations on Singly linked list, Doubly Linked lists, Circular linked lists, and header linked lists. Linked Stacks and Queues. Applications of Linked lists – Polynomials, Sparse matrix representation. Programming Examples.							

**Module-4**

Trees 1: Terminologies, Binary Trees, Properties of Binary trees, Array and linked Representation of Binary Trees, Binary Tree Traversals - Inorder, postorder, preorder; Threaded binary trees, Binary Search Trees – Definition, Insertion, Deletion, Traversal, and Searching operation on Binary search tree. Application of Trees-Evaluation of Expression.

**Module-5**

Trees 2: AVL tree, Red-black tree, Splay tree, B-tree. • Graphs: Definitions, Terminologies, Matrix and Adjacency List Representation of Graphs, Traversal methods: Breadth First Search and Depth First Search. Hashing: Hash Table organizations, Hashing Functions, Static and Dynamic Hashing.

<b>List of Text Books</b>
<b>Text Books:</b> <ol style="list-style-type: none"><li>1. Ellis Horowitz and Sartaj Sahni, Fundamentals of Data Structures in C, 2nd Ed, Universities Press, 2014.</li><li>2. Seymour Lipschutz, Data Structures Schaum's Outlines, Revised 1st Ed, McGraw Hill, 2014.</li><li>3. Reema Thareja, Data Structures using C, 3rd Ed, Oxford press, 2012.</li></ol>
<b>List of Reference Books</b>
<b>Reference Books:</b> <ol style="list-style-type: none"><li>1. Gilberg and Forouzan, Data Structures: A Pseudo-code approach with C, 2nd Ed, Cengage Learning, 2014.</li><li>2. Jean-Paul Tremblay &amp; Paul G. Sorenson, An Introduction to Data Structures with Applications, 2nd Ed, McGraw Hill, 2013</li><li>3. A M Tenenbaum, Data Structures using C, PHI, 1989</li><li>4. Robert Kruse, Data Structures and Program Design in C, 2nd Ed, PHI, 1996.</li></ol>
<ol style="list-style-type: none"><li>1. <a href="http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html">http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS35.html</a></li><li>2. <a href="https://nptel.ac.in/courses/106/105/106105171/">https://nptel.ac.in/courses/106/105/106105171/</a></li><li>3. <a href="http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html">http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html</a></li></ol>

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

[illegible]

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

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

<b>Subject Code:</b>	<b>BCS304</b>	<b>TITLE: Data Structure and Applications</b>	<b>Faculty Name:</b>	Arjun G S
<b>List of Course Outcomes</b>	<b>Program Specific Outcomes</b>			
	<b>PSO-1</b>	<b>PSO-2</b>	<b>Total</b>	
<b>CO-1</b>	2	-	2	
<b>CO-2</b>	2	1	3	
<b>CO-3</b>	2	1	3	
<b>CO-4</b>	2	1	3	
<b>CO-5</b>	2	1	3	
<b>Total</b>	<b>10</b>	<b>4</b>	<b>14</b>	