

Course Structure

Course Code	BCA20040				
Course Category	Program Major				
Course Title	Data Structures using 'C'				
Teaching Scheme	Lectures	Tutorials	Laboratory/Practical	Project	Total
Weekly Load Hrs.	3	-	2-		5
Credits	3	-	1-	-	4
Assessment Schema Code	TL3				

Course Objectives:

1. To introduce the fundamental concept of data structures
2. To emphasize the importance of data structures in developing and implementing efficient algorithms.

Course Outcomes:

After completing this course, a student will be able to:

1. Describe how arrays, records, linked structures, stacks, queues, trees, are represented in memory and used by algorithms.
2. Describe common applications for arrays, records, linked structures, stacks, queues, and trees
3. Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
4. Demonstrate different methods for traversing trees.
5. Compare alternative implementations of data structures with respect to performance.
6. Compare and contrast the benefits of dynamic and static data structures implementations.
7. Design and implement an appropriate hashing function for an application.

Course Contents:

Unit 1: Introduction [7]

- Self-referential structure
- Data Structures
- Primitive and Non-Primitive Data Structures
- Linear and Non-linear Structures.
- Algorithm, Analysis of algorithm, Big O notation.

Unit 2: Linked List [7]

- Representation –Static & Dynamic
- Singly Linked List Creation, Insertion (Begin, Middle, End), Printing, deleting (Begin, Middle, End) Traversing.



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- Doubly Linked list (Creation, Deletion)
- Circular Singly Linked list (Creation, Deletion)

Unit 3: Stack and Queue [7]

- Stack-Static and Dynamic Representation, Operation,
- Applications of Stack:-Evaluation of postfix expression, conversion of Infix expression to postfix form, Reversal of a string
- Queue -Static and Dynamic Representation, Operation, Priority Queue, Circular Queue (Implementation)

Unit 4: Trees [8]

- Definition
- Terminology
- Representation
- Binary tree
- Representation(Both)
- Binary Tree Traversal Inorder, Preorder, Postorder
- Binary Search Tree (Implementation)
- Heap
- AVL / Height Balanced tree

Unit 5: Graphs, Searching, Sorting: [9]

- Introduction, Graph Terminology,
- Representation of Graphs:-Adjacency matrix,Adjacency List.
- Graph Traversals :-DFS,BFS
- Shortest Path Algorithms.
- Searching and Sorting:**
- Searching,
- Types of Searching
- Sorting:-Types of sorting like bubble sort,insertion sort ,merge sort, selection sort, quick sort

Unit 6: Hashing: [7]

- Hash Function,
- Types of Hash Functions
- Collision
- Collision Resolution Technique(CRT),
- Perfect Hashing

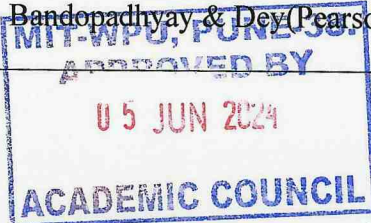
Learning Resources:

Text Books:

- “Introduction to Algorithms”, Thomas H. Charles E. Leiserson, Ronald L. Rivest and Clifford Stein. Cormen 3rd Edition (The MIT Press) 3rd Edition
- Data Structures and Algorithms Made Easy, Narsimha Karumanchi
- Algorithms, Robert Sedgewick and Kevin Wayne.

Reference Books:

- Fundamentals of Data structures, . Horowitz and S. Sahani
- Introduction to Data Structures in C, Ashok N. Kamthane
- Data Structure Using C, Radhakrishnan and Shrivastav
- Data Structure Using C, Bandopadhyay & Dey (Pearson)



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Websites:

- <https://www.programiz.com/dsa>
- <https://www.w3schools.in/data-structures/intro>
- <https://www.youtube.com/watch?v=RBSGKIAvoiM>

Pedagogy:

- Participative Learning,
- Discussion
- Demonstrations
- Practical
- Assignment

Lab on Data structures

Sr.No	Practicals to be conducted on
1.	Implementation of arrays , pointers, structures, pointer to structure, array of pointers
2.	Implementation of linked list(singly,doubly,circular)
3	Implementation of Stack and Queue using arrays and linked list
4	Implementation of searching and sorting algorithms
5	Implementation of Tree
6	Implementation of Graph
7	Implementation of Hash functions

