

## EC-200 Data Structures - Course Contents

a. **Credits:** 3+1

b. **Text Book:**

Y. Langsam, M. J. Augenstein, A. M. Tenenbaum, “**Data Structures Using C and C++**,” Prentice Hall, Latest Issue

c. **Reference Books:**

1. Frank M. Carrano, “**Data Abstraction and Problem solving with C++**,” 3<sup>rd</sup> Ed., Addison Wesley, 2004.
2. Michael T. Goodrich, Roberto Tamassia, David Mount, “**Data Structures and Algorithms in C++**,” Wiley, 2004.
3. Mark Allen Weiss, “**Data Structures and Algorithm Analysis in C**,” Addison Wesley, 2010.

d. **Objectives:**

1. To provide students with an appreciation of data structures as methods for organizing and manipulating large amount of data.
2. To enable students to conceptualize Abstract Data Types (ADTs) for solving current research issues and implement data structures in that frame work.
3. To familiarize students with the techniques of algorithm analysis, particularly the Big O Notation for complexity analysis and comparison of various algorithms.
4. To provide students with an appreciation of how various data structures are used in real-life computing environments.
5. To enable students to program data structures and algorithms using industry standard language C.

e. **Course Outcomes:** On completion of course:

1. The students will be familiar with different types of linked lists along with their applications and implementation.
2. The students will have thorough understanding of the stack data structure and its various applications along with its implementation.
3. The data structure queue will be familiar to the students and they will be able to implement a queue and use it for specific applications.
4. Various applications of trees specially binary trees and binary search trees will be known to the students and they will be able to

implement a simple binary tree and binary search tree Abstract Data Type (ADT)

5. The students will have acquired knowledge of complexity analysis of algorithms and will be able to evaluate the efficiency of simple algorithms like those used in searching/sorting using Big O Notation.
6. The most popular sorting and searching algorithms will be well-known to the students and they will be able to understand the logic behind each.
7. The students will have a clear understanding of the graph data structure and its applications.
8. Hashing techniques and related issues will be well-known to the students.

a. **Topics**

1. Introduction to Data Structures
2. Algorithm Analysis
3. Built-in Data Structures in C
4. Linked Lists
5. Stack
6. Queue
7. Recursion
8. Tree
9. Sorting and Searching
10. Graphs
11. Hashing