MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer Science and Engineering
Course Hand-out

Data Structure | CS 1303 | 4 Credits

Course Outcomes: At the end of the course, students will be able to

[CS1302.1] Explain basic concepts of various data structures

[CS1302.2] Describe how arrays, linked lists, stacks, queues, trees and graphs are represented in memory and their operations

[CS1302.3] Select and/or apply appropriate data structures to solve problems and assess the trade-offs involved in the design choices.

[CS1302.4] Describe and analyse various sorting algorithms like bubble, selection, insertion, merge sort, heap sort and quick sort and therefore develop employability skills.

A.   SYLLABUS

Introduction: Algorithm specification; Performance Analysis: Time and Space Complexity, Asymptotic notation; pointer declaration and definition, memory allocation functions, array of pointers; The type definition, enumerated types, accessing structures, complex structures, arrays of structures, structures and functions; Recursive definition & processes, Recursion in C, writing recursive programs efficiency of recursion, Examples: Tower of Hanoi, GCD, Fibonacci Definition and examples, Representing Stacks in C, Evaluation of expressions, multiple stacks and queues; Applications: infix, postfix and prefix and their conversions. Linked lists representations, Singly, doubly, header node, circular, Applications: linked stacks and queues, polynomial and long integer arithmetic, union, intersection, Basic terminologies, binary tree representation, recursive/ non recursive, Binary search tree, AVL trees; Applications: Expression Trees, inserting, deleting, searching, height of BST Terminology and representations, Graph operations, spanning trees, minimum cost spanning tree, shortest path and transitive closure, Binary and linear search, insertion, quick, merge, heap, radix sort Static Hashing.

B.   TEXT BOOKS

I. T1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, "Fundamentals of Data Structures in C", University Press (India) Pvt. Ltd., 2014.

II. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, "Data Structures using C", Pearson Education, 2013.

III. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, 2012

IV. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, " Introduction to algorithms", PHI, Third Edition, 2009.

V. Seymour Lipschutz, "Data Structures with C (Schaum's Outline Series)", McGraw Hill Education Private Limited, 2011.

VI. Mark Allen Weiss, "Data structures and Algorithm Analysis in C", Pearson, Second edition,