

COURSE TITLE	DATA STRUCTURE AND ALGORITHMS
COURSE CODE	01CE1532
COURSE CREDITS	3

Objective:

- 1 The objective of this course is to implement efficient algorithms and programs it is necessary to organize or structure the data. Understanding of data structures and their related applications are highly needed to build a sustainable program.
- 2 To implement efficient algorithms and programs it is necessary to organize or structure the data. Understanding of data structures and their related applications are highly needed to build sustainable program.

Course Outcomes: After completion of this course, student will be able to:

- 1 Recognize the need of data structures in real time applications.
- 2 Analyse various data structures and their applications.
- 3 Design and implement various techniques for searching and sorting algorithms to the small and large data sets.
- 4 Identify appropriate data structures for the requested requirement for a given application.

Pre-requisite of course: Computer Programming in C

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Introduction to Data Structures Data Management concepts, Data types – primitive and non-primitive, Types of Data Structures, Linear & non-linear Data Structures	6
2	Linear Data Structures & their representation Representation of arrays, sparse matrix and its representation, Storage Structures for arrays, Applications of arrays, Stack definitions and concepts, operations on stacks (push, pop, peep, change), Polish Expressions and their compilation and Tower of Hanoi, Representation of queue, operations on queue (insert, delete), Simple Queue, Circular Queue, Double Ended Queue, Priority queues, Applications of Queue, Linked list Understanding and their Operations, Singly Linked List, Doubly Linked List, Circular Linked List, Circular Doubly Linked List, Applications of Linked List	18

Contents : Unit	Topics	Contact Hours
3	Nonlinear Data Structure Tree definitions and their concepts, Representation of binary tree, Binary tree traversal methods and their examples (Inorder, postorder, preorder), Binary search trees, Method to Convert a general trees to binary tree, Threaded binary tree, Applications of Trees, Balanced tree and its mechanism, AVL tree, Weight Balanced Trees, B Tree and B+ Tree, Graphs and their understanding, Matrix representations of a given graph, Depth First Search (DFS), Breadth First Search (BFS), Minimum Spanning Trees Algorithms (Prims, Kruskal, Dijkstra), Path Matrix, Warshall's Algorithm	18
Total Hours		42

Textbook :

- 1 An Introduction to Data Structures with Applications, Jean-Paul Tremblay and Paul G. Sorenson, Tata McGraw Hill, 2017
- 2 Data Structures using C & C++, Aaron M. Tenenbaum, Pearson Education India, 2015
- 3 Data Structures and Program Design in C, Robert L. Kruse, Pearson Education India, 2006

References:

- 1 Data Management and File Structures, Data Management and File Structures, Mary E.S. Loomis, Prentice-Hall, 1989

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
20.00	20.00	20.00	15.00	10.00	15.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <https://visualgo.net/en>
- 2 <https://www.cs.usfca.edu/~galles/visualization/Algorithms.html>
- 3 <https://quizlet.com>