

Branch Name:	Computer Engineering / Information Technology / Information and Communication Technology
Program Code:	ET103/ET105 / ET107
Course Title:	Data Structure
Course Code:	2ET1030302T
Pre-requisite Course:	Computer Programming & utilization

Course Objectives: The Objective of this course is to make the students learn about the mapping between data structures & algorithms, designing and analyzing algorithms for real-world problems.

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Introduction to Data Structure: Data Management concepts, Data types – primitive and non-primitive, Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis), Types of Data Structures- Linear & Non Linear Data Structures.	02	10
2	Array, Structure and Pointer: Representation of arrays, Applications of arrays, sparse matrix and its representation, Declaration of structures, Use of structure through function, Use of Pointer variable, Pointer Arithmetic, Passing parameters by reference, Pointers to Functions, Pointer to Structures Dynamic memory allocation.	03	10
3	Linear Data Structure: Stack: Stack-Definitions & Concepts, Operations On Stacks, Applications of Stacks, Evaluation of postfix, Polish Expression, Reverse Polish Expression And Their Compilation, Recursion, Tower of Hanoi. Queue: Representation Of Queue, Operations On Queue, Circular Queue, Priority Queue, Double Ended Queue, Applications of Queue Linked List: Singly Linked List, Doubly Linked list, Circular linked list, Linked implementation of Stack, Linked implementation of Queue, Applications of linked List(Polynomial Addition).	13	25
4	Non-Linear Data Structure: Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, Binary search trees, Conversion of General Trees To Binary Trees, Applications Of Trees. Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, B-Tree. Graph-Introduction of Graph,Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree)	10	25
5	Hashing and File Structures: Hashing: The symbol table, Hashing Functions, Collision Resolution Techniques. File Structure: Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods	05	15
6	Sorting & Searching: Searching- Sequential Search and Binary Search Sorting – Bubble Sort, Selection Sort, Insertion sort, Quick Sort, Merge Sort Searching	05	15

Reference Books:

- An Introduction to Data Structures with Applications. by Jean - Paul Tremblay & Paul G. Sorenson Publisher - Tata McGraw Hill.
- Data Structures: A Pseudo-code approach with C -By Gilberg & Forouzan Publisher Thomson Learning.
- Data and File Structures using C: Thareja, Reema Oxford University Press New Delhi 2011
- Fundamentals of Computer Algorithms By Horowitz, Sahni, Galgotia
- Data Structures using C & C++ -By Ten Baum Publisher – Prentice-Hall International.

List of Open-Source Software/learning website:

- <http://www.nptelvideos.in/2012/11/data-structures-and-algorithms.html>
- https://www.tutorialspoint.com/data_structures_algorithms/
- Data Structure Fundamentals: <http://www.cprograms.in/index.htm>
- Data structure video <http://www.youtube.com/watch?v=tORLeHHtazM>
- <https://nptel.ac.in/courses/106102064/>
- <https://nptel.ac.in/courses/106103069/>

Course Learning Outcomes (CLO):

Course Outcomes	Description	Bloom's Taxonomy Level
COL1	Understand basic knowledge of data structure operations like insertion, deletion etc for various data structures and their application. Be able to compare functions using asymptotic analysis and describe the relative merits of worst-, average-, and best-case analysis.	1.Remembering 2. Understanding
COL2	Analyze the problem and create appropriate algorithm	1.Remembering 4. Analyse 5. Creating
COL3	Develop and implement various programs using C for nonlinear data structure.	1.Remembering 2. Understanding 5. Creating
COL4	Investigate and solve difficulties in the implementation of searching & sorting technique	1.Remembering 3. Applying 2.Understanding
COL5	Know application files and graphs in the real world.	1.Remembering 2. Understanding
COL6	Discuss hashing and different collision resolve techniques	1.Remembering 2.Understanding

Mapping of CLO with PO and PSO :

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CLO1		L		L									M	
CLO2		L												M
CLO3	L	H	M	H	L				L		M		H	
CLO4		M	H		L				L		H		H	H
CLO5	L		L			M								H
CLO6		M									H			H

H: High, M: Medium, L: Low