

Branch Name:	COMPUTER ENGINEERING (SOFTWARE ENGINEERING)
Program Code:	ET203
Course Title:	Advance Data Structure
Course Code:	2ET2030104T
Pre-requisite Course:	Basic knowledge of common programming concepts, including loops, arrays, stacks, and recursion.

Course Objectives:

The course provides an insight of advance concepts related to data structures and applications.

The course focuses on to gain the knowledge about the fundamental use of advance data structures

Teaching and Examination Scheme:

it	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								
					Theory (Marks)				Practical (Marks)				Total (Marks)
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
	2	-	-	2	24	60	16	40	-	-	-	-	100

Course Contents:

Unit No	Topics	Total Hours	Weightage (%)
1	Linear Data Structure:- Abstract data type (ADT), stack and it's applications, queue, circular and double ended queue, applications of queue, singly linked list, doubly linked list, circular linked list and applications of linked list.	08	15
2	Non-linear Data Structures:- Definition of tree and concepts, binary search tree, AVL tree, B-tree, red-black tree, 2-3 tree, splay tree, graph - traversing graphs, depth first search, breath first search, applications of graphs, topological sorting, shortest path algorithms.	09	20
3	Hashing & Skip Lists :- General Idea, Hash Function, Separate Chaining, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Universal Hashing, Extendible Hashing, Skip list representation, Search and Update Operations on skip lists.	08	15
4	Sorting:- Shell sort, heap sort, merge sort, quick sort, radix sort, comparison of sorting methods.	06	20
5	Backtracking and Branch and Bound:- Introduction, the eight queens' problem, knapsack problem and travelling salesman problem.	07	20
6	String Matching – The naive string-matching algorithm, The Rabin-Karp algorithm, The Knuth-Morris-Pratt algorithm.	07	10

Text Books:

1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Fourth Edition, 2014, Pearson.
2. Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford

Reference Books:

- Data Structures and Algorithms Made Easy by Narasimha Karumanchi, 2020, CareerMonk Publications.
- Advanced Data Structures, Peter Brass, Cambridge University Press, 2008.
- Data Structures and Algorithms Made Easy: Data Structures and Algorithmic Puzzles by Narasimha Karumanchi.

List of Open-Source Software/learning website:

- <http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms>
- <https://www.mooc-list.com/search/node?keys=Advanced+Data+Structures>
- <https://nptel.ac.in/courses/106/106/106106133/>
- Advanced Data Structure Tutorial: <https://www.programiz.com/dsa>

Course Learning Outcomes (CLO):

Course Outcomes	Description	Bloom's Taxonomy Level
CLO1	Define and classify various data structures, storage structures and common operations on them	Understanding (2) Applying (3)
CLO2	Create various linear & nonlinear data structures with their representation and perform different operations on them	Understanding (2) Applying (3)
CLO3	Apply various searching sorting techniques on data set	Applying (3)
CLO4	To learn algorithm design techniques of backtracking and branch & bound.	Applying (3)
CLO5	Solve the given a problem using an appropriate data structure to achieve optimal performance and compare its performance with other possible data structures	Applying (3)

Mapping of CLO with PO and PSO

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	H	M	M	H	M											
CLO2	H	M			M											
CLO3	H	M	M		M											
CLO4	M	M	M		M											
CLO5	H	M										L				

H: High, M: Medium, L: Low