

ADVANCED DATA STRUCTURES SYLLABUS

Course Code:	20CS3402	Year:	II	Semester:	II
Course Category:	Professional Core Course	Branch:	CSE	Course Type:	Theory
Credits:	3	L-T-P:	3-0-0	Prerequisites:	Data Structures (20ES1305), Object Oriented Programming through C++ (20CS3302)
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

COURSE OUTCOMES

Upon successful completion of the course, Student will be able to

CO1	Understand the basic principles and operations of data structures.	L2
CO2	Apply Hashing and String Matching techniques for solving problems effectively.	L3
CO3	Apply the concepts of advanced Trees and Graphs for solving problems effectively.	L3
CO4	Analyze the given scenario and choose appropriate Data Structure for solving problems.	L4

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	√													
CO2	√								√	√		√	√	√
CO3	√								√	√		√	√	√
CO4		√							√	√		√		√

Unit No.	SYLLABUS CONTENTS	Mapped CO
I	Hashing – General Idea, Hash Function, Separate Chaining, Hash Tables without linked lists: Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Hash Tables in the Standard Library, Universal Hashing, Extendible Hashing.	CO1, CO2
II	Priority Queues (Heaps) – Model, Simple implementations, Binary Heap: Structure Property, Heap Order Property, Basic Heap Operations: insert, delete, Percolate down, Other Heap Operations. Binomial Queues: Binomial Queue Structure, Binomial Queue Operations, Implementation of Binomial Queue, Priority Queues in the Standard Library.	CO1,CO2
III	Trees – AVL: Single Rotation, Double Rotation, B-Trees. Multi-way Search Trees – 2-3 Trees: Searching for an Element in a 2-3 Tree, Inserting a New Element in a 2-3 Tree, Deleting an Element from a 2-3 Tree. Red-Black Trees – Properties of red-black trees, Rotations, Insertion, Deletion.	CO1, CO3
IV	Graphs Algorithms – Elementary Graph Algorithms: Topological sort, Single Source Shortest Path Algorithms: Dijkstra’s, Bellman-Ford, All-Pairs Shortest Paths: Floyd-Warshall’s Algorithm.	CO1,CO3, CO4
V	Disjoint Sets – Equivalence relation, Basic Data Structure, Simple Union and Find algorithms, Smart Union and Path compression algorithm. String Matching – The naive string-matching algorithm, The Rabin-Karp algorithm, The Knuth-Morris-Pratt algorithm.	CO1, CO2, CO4

Learning Resources
Text Books
<ol style="list-style-type: none"> 1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, 4th Edition, 2014, Pearson. 2. Introduction to Algorithms, Thomas H Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 3rd Edition, 2009, The MIT Press.
References Text Book
<ol style="list-style-type: none"> 1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahani and Rajasekharam, 2nd Edition, 2009, University Press Pvt. Ltd. 2. Advanced Data Structures, Reema Thareja, S. Rama Sree, Oxford University Press, 2018.
e-Resources and other Digital Material
<ol style="list-style-type: none"> 1. http://www.coursera.org/learn/advanced-data-structures 2. http://ocw.mit.edu/6-851S12 (MITOPENCOURSEWARE, Massachusetts Institute of Technology) 3. https://nptel.ac.in/courses/106/106/106106133/ 4. https://www.mooc-list.com/search/node?keys=Advanced+Data+Structures 5. http://freevidelectures.com/Course/2279/Data-Structures-And-Algorithms