

Design and Analysis of Algorithms (DAA) —

Syllabus (2025)

Unit	Course Topics	Hours
1	Introduction to Algorithms: Characteristics of algorithms, algorithm specification, performance analysis, time & space complexity, asymptotic notations (Big-O, Ω , Θ), recurrence relations	4L
2	Divide and Conquer: General method, recurrence relations, master theorem, algorithms for binary search, merge sort, quick sort, selection problem, Strassen's matrix multiplication	6L
3	Greedy Method: General strategy, characteristics of greedy algorithms, optimality, applications — fractional knapsack, job sequencing with deadlines, minimum cost spanning trees (Prim's and Kruskal's), Dijkstra's shortest path algorithm	6L
4	Dynamic Programming (DP): Characteristics, overlapping subproblems, optimal substructure, DP vs recursion, applications — matrix chain multiplication, 0/1 knapsack, all-pairs shortest path (Floyd-Warshall), longest common subsequence	6L
5	Backtracking & Branch-and-Bound: Backtracking strategy, N-Queens problem, subset sum, graph coloring, Hamiltonian cycle; Branch-and-Bound: least cost (LC) search, FIFO and LIFO branch-and-bound	5L
6	Graph Algorithms: BFS, DFS, connected components, topological sorting, biconnectivity, articulation points, minimum spanning tree review, shortest path algorithms	4L
7	NP Theory & Approximation Algorithms: P, NP, NP-hard, NP-complete concepts, reductions, SAT problem, travelling salesman problem (TSP), vertex cover, approximation algorithms and performance ratios	4L