

- Asymptotic Notations (6 hr)
 - Computational Complexity - Big Oh, Theta, Omega notations
 - Analysing non-recursive algorithms
 - Deterministic vs non-deterministic algorithms
 - Introduction to probabilistic analysis

- Trees and Heaps (6 hrs)
 - BST operations, traversals
 - Heap operations, heap sort

- Hashing(3 hrs)
 - Introduction to hashing
 - Collision and collision resolution techniques

- Divide and Conquer (9 hrs)
 - What is recursive thinking? How to analyze recursion?
 - Problem solving - Fibonacci Sequence, Towers of Hanoi, merge sort, quick sort, counting inversions, finding closest pair of points, Karatsuba's multiplication, Maximum subarray problem

- Graphs (6 hrs)
 - Basic graph theoretic concepts
 - Graph representation - Adjacency matrix and adjacency lists
 - Graphs traversal and their applications - BFS, DFS
 - DAG's (Directed Acyclic Graphs) and topological sorting

- Greedy Method (9 hrs)
 - Understanding the design paradigm
 - Does greedy method always work? Correctness proofs
 - Problem solving - problems in job scheduling, fractional knapsack problem, Dijkstra alg, Prim's alg, Kruskals alg

- Dynamic Programming (9 hrs)
 - Understanding the design paradigm
 - Top down and bottom up approaches
 - Problem solving - Rod cutting, matrix multiplication, 0/1 Knapsack problem, segmented least square problem, scheduling problems, longest common sub-sequence, Bellman-Ford Algorithm, Floyd Warshall Algorithm,

- Introduction to NP-Completeness (3 hrs)
 - What are hard problems?
 - NP-Completeness, P = NP?