Course 14. Data Structures and Algorithms (Video Course)

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Detailed Syllabus :

Data Structures

Course objective: The objective of the course is to familiarize students with basic data structures and their use in fundamental algorithms.
Course contents: Introduction to object oriented programming through stacks, queues and linked lists. Dictionaries: skip-lists, hashing, analysis of collision resolution techniques. Trees, traversals, binary search trees, optimal and average BST's. 2-4 trees and red-black trees. Tries and pattern matching. Priority queues and binary heaps. Sorting: merge, quick, radix, selection, heap. Graphs, Breadth first search and connected components. Depth first search in directed and undirected graphs and strongly connected components. Spanning trees: Prim's and Kruskal's algorithm, union-find data structure. Dijkstra's algorithm for shortest paths, shortest path tree. Directed acyclic graphs: topological sort and longest path.

Lecture outline with topics and no. of lectures

Introduction to object oriented programming through stacks, queues and linked lists	4
Dictionaries: skip-lists, hashing, analysis of collision resolution techniques	5
Trees, traversals, binary search trees, optimal and average BST's6	
2-4 trees and red-black trees	4
Tries and pattern matching. Priority queues and binary heaps	5
Sorting: merge, quick, radix, selection, heap	3
Introduction to Graphs, Breadth first search and connected components.	3
Depth first search in directed and undirected graphs and strongly connected components	3
Spanning trees: Prim's and Kruskal's algorithm, union-find datastructure.	4
Dijkstra's algorithm for shortest path. shortest path tree. Shortest and longest paths in directed acyclic graphs	5

Suggested texts and reference materials

Data Structures and Algorithm in Java: Goodrich and Tamassia: John Wiley and Sons.
Introduction to Algorithms: Cormen, Leiserson, Rivest and Stein: Prentice Hall of India
Data Structures and Algorithms: Aho, Hopcroft and Ullmann: Addison Wesley.