Syllabus: Data Structures and Algorithms (DSA) -2012

Algorithms and problem solving, Computer programming for problem solving: basic idea of C language, C data types, control structure, pointers, arrays, structures: self referential structures.

Data structures: linear list, array implementation of lists, linked lists, implementation of linked lists, list and linked list applications, stack data structure: array implementation of stacks, applications of stack: recursive programming, queue data structure: array implementation of queues, applications of queues: job scheduling, linked list implementation of stack and queues.

Sorting: bubble sort, selection sort, insertion sort, merge sort, quick sort, heap sort.

Searching: Linear (sequential) and binary search.

Graphs and Trees: Basic terminology, trivial graph, directed and undirected graph, path, loop (closed path), implementation of graph using linked list; Graph traversal: DFS and BFS; Trees: trivial tree, binary tree, m-way tree, conversion of graph into tree, DFS and BFS based spanning trees, Kruskal's algorithm, Prim's algorithm, applications of graphs; Shortest path algorithm, applications in Bioinformatics

Search trees: Binary and m-way search trees (introduction), binary search and binary tree search, linked list implementation of binary trees, height balance trees (AVL) for searching (introduction), B tree (introduction); applications of trees and search trees

Heaps: Heap as binary tree, generation of heaps, heap sorting

Hashes: Hashing by chaining

Labs:
Bubble sort, Selection sort, Insertion sort, Mergesort, Quicksort, Binary Search, Stacks, Queues, DFS, BFS, Shortest Path, Binary search trees, Hash

Reference books:

1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein
2. Data Structures Using C and C++, Yedidyah Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum
3. The C Programming Language (2nd Edition), Brian W. Kernighan and Dennis Ritchie