Syllabus for Data and File Structures

Subject Code: DSA-233

Algorithm

- Data Structure def, classification, ADT
- Algorithm representation and complexity
- Pointers, strings, arrays (1-D and n-D)
- Elapsed time
- `malloc`, `realloc`, `calloc`

Programming Tools

- Structures, Classes
- Class and function templates
- STL: containers, iterators
- STL: algorithms, functors

Recursion

- Simple recursion
- Fibonacci numbers

Searching and Sorting

- Binary search
- Selection sort
- Insertion sort
- Mergesort
- Quicksort
- Quickselect

Stacks

- Stacks
- Pre-, in-, post-fix conversions
- Evaluations of expressions

Lists and Queues

- Linked lists
- Simple queues
- Circular queues

Graph Theory

- Graphs
- Simple trees
- Heaps, heapsort
- Priority queues
- Binary trees, *n*-ary trees
- Binary search trees
- Traversals
- Trie tree
- Disjoint sets
- Kruskal's MST using disjoint sets
- Dijkstra's Algorithm
- Floyd-Warshall's algorithm
- AVL trees, B-, B+-trees
- Threaded trees

Tables and Information

- BFS and DFS searches
- Backtracking: 8-queen problem
- Hashing

String algorithms

- Simple string manipulations
- Pattern search with Rabin-Karp approach

Tools

Operating system: GNU/Linux
Langauges: ANSI C (C89) and C++ (1998)
Graph visualization tool: graphviz
Data and function plotter: gnuplot

Books

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