

# Data Structures and Algorithms (DSA-232)

## Algorithm

Data Structure def, classification, ADT  
Algorithm representation, complexity

Pointers, arrays (1-D and n-D), strings  
Elapsed time calculation (L1)

## Stacks

Stacks (L2)  
Pre-, in-, post-fix conversions  
Evaluations of expressions

## Recursion

Simple recursion  
Fibonacci numbers  
Backtracking: 8-queen problem (L3)

## Lists and Queues

Linked lists  
Queues (L4)  
Circular queues

## Searching and Sorting

Binary search (L5)  
Selection sort, Insertion sort

Mergesort  
Quicksort (L6)  
Quickselect

## Graph Theory

Graphs, trees  
Binary trees,  $n$ -ary trees  
Heaps, heapsort (L7)

Priority queues  
Binary search trees (L8)  
Trie tree

Disjoint sets (L9)  
Kruskal's MST using disjoint sets  
Dijkstra's Algorithm

Floyd-Warshall's algorithm (L10)  
BFS and DFS searches (L11)  
AVL trees, B-trees

## Hashing

Hashing by chaining (L12)  
Perfect hashing function

## String algorithms

Simple string manipulations  
Rabin-Karp approach (L13)

## Tools

**Operating system:** GNU/Linux  
**Languages:** C++ (C++98)  
**Graph visualization tool:** graphviz  
**Data and function plotter:** gnuplot

## Books

1. **Introduction to Algorithms** by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein (3Ed) (Text)
2. **Data Structures Using C and C++** by Yediyah Langsam, Moshe J. Augenstein and Aaron M. Tenenbaum (Text)
3. **C Programming Language** (Ed 2) by Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall (Ref)
4. **Expert C Programming: Deep C Secrets** by Peter van der Linden, Prentice Hall (Ref)