

Data Structures    [course info](#)    [lectures](#)    [exams](#)

[R. Inkulu](#) at cse.iitg in Fall 2019

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Asymptotic notation    [CLRS]: 43-52

Introduction    [CLRS]: 1-14, 23-29, 147-148; [HSA]: 22-40

Elementary data structures

Array    [HSA]: 18-21, 51-55, 67, 74; [CLRS]: 230-231

Linked list    [CLRS]: 236-240; [HSA]: 145-149, 186-189

Appl: polynomials and sparse matrices    [HSA]: 64-83, 160-168, 178-185 --- AR

Stack    [CLRS]: 232-234; [HSA]: 107-113

Appl: evaluating expressions    [HSA]: 127-136

Queue    [CLRS]: 234-235; [HSA]: 114-120

Trees and their traversals    [CLRS]: 246-248; [HSA]: 205-211, 216-222

Searching in a sorted array

Linear search, binary search    [HSA]: 12-13

More analysis techniques

Probabilistic analysis: hiring    [CLRS]: 114-116, 120-121, 139-141, 1154-1156

Expected analysis: randomized hiring    [CLRS]: 122-124, 126-128

Comparison sorts

Bubble sort, selection sort    [wiki]: [1](#), [2](#)

Insertion sort    [CLRS]: 16-22; [\[wiki\]](#)

Shellsort (with Shell's sequence)    [\[W\]](#): 296-298; [wiki](#)

Probabilistic analysis: sorting and searching    [\[R\]](#): 480-481, 482-484

Mergesort    [CLRS]: 29-37

Quicksort    [CLRS]: 170-176, 180-181

Randomized quicksort    [CLRS]: 177-179, 181-184

Also see heapsort noted below

Bucket sort    [CLRS]: 200-204

Sorting with no comparisons

Counting sort    [CLRS]: 194-196

Radix sort    [CLRS]: 197-199

Selection

Minimum and maximum    [CLRS]: 213-215

Hoare's Las Vegas algo    [CLRS]: 215-219

Blum et al.'s worst-case linear time algo [CLRS]: 220-222

### Worst-case lower bound

Decision trees: comparison sort [CLRS]: 191-193

Adversary arguments: minimum, min and max, median [\[note\]](#)

### Binary search tree

Algo for basic operations [CLRS]: 286-299; [HSA]: 236-237

Expected height of a randomly built BST [CLRS]: 299-303; [\[Jensen's ineq\]](#)

### Priority queue

Binary heap [CLRS]: 151-159, 162-165

An appl of binary heap: heapsort [CLRS]: 159-161

--- more will be added ---

- [CLRS]: Introduction to Algorithms by Cormen, Leiserson, Rivest, and Stein, Third Edition.
  - [HSA]: Fundamentals of Data Structures in C by Horowitz, Sahni, and S. Anderson-Freed, Second Edition.
  - Additional resources are provided where necessary.
  - Prereq denotes that this topic is typically taught in a prereq course.
  - AR stands for additional reading (no lecture delivered but included in syllabus).
  - EP stands for a problem of importance but it is given as part of an exam.
  - NS says that it is not part of the syllabus although it was taught.
  - The slides of C programming course (prereq) are accessible from [here](#).
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