

CSc 220 – Algorithms

Text: *Introduction to Algorithms* 3rd ed. By Cormen, Leiserson, Rivest, and Stein
The MIT Press, 2009.

Cp. 1 The Role of Algorithms in Computing

Sec. 1, 2

hw: sec. 1/ p.11 # 1-5
sec. 2/ p.14 # 2,3

Cp. 2 Getting Started.

Insertion sort. Analyzing and Designing algorithms.

Sec. 1 – 3

hw: sec. 1/p.22 # 1,3
sec.2/p.29 #1-4
sec. 3/p. 37 #1, 3-5
Problems / p. 39 # 1-4

Cp. 3 Growth of Functions.

Asymptotic notation.

Sec. 1- 2

hw: sec. 2/ p. 61 # 1,2

Cp. 4 Divide-and-Conquer.

The maximum-subarray problem. Strassen's algorithm for matrix multiplication.

Solving recurrences.

Sec. 1 – 5

hw: sec. 1 / p. 74 # 1,2
sec. 2 / p. 82 # 1
sec. 3 / p. 87 # 1-3

Cp.5 Probabilistic Analysis and Randomized Algorithms.

The hiring problem. Indicator random variables.

Sec. 1 – 3

hw:

Cp. 6 Heapsort.

Heaps. Building a heap. Priority queues.

Sec. 1 – 5

hw: sec. 1 / p. 153 # 1-6
sec. 2 / p. 156 # 1,3
sec. 3 / p. 159 # 1
sec. 4 / p. 160 # 1,3

sec. 5 / p.160 # 1,2,7

Cp. 7 Quicksort

Description, Performance, and Analysis of quicksort.

Sec. 1 – 4

hw: **sec. 1 / p. 74 # 1,2**
 sec. 2/ p. 178 # 1,2
 sec. 3 / p. 180 # 2
 sec. 4 / p. 184 # 2

Cp. 8 Sorting in Linear Time.

Lower bounds for sorting. Counting, radix, and bucket sorts.

Sec. 1 – 4

hw: **sec. 1 / p. 193 # 1**
 sec. 2 / p. 196 # 1,2
 sec. 3 / p. 199 # 1,2
 sec. 4 / p. 204 # 1
 Problem # 4

Cp. 9 Medians and Order Statistics.

Finding the minimum and maximum.

Selection in expected (worst-case) linear time.

Sec. 1 – 3 (if time permits).

hw: **sec. 1 / p. 215 # 1**
 sec. 2 / p. 220 # 4
 sec. 3 / p. 223 # 1,3,4,9
 Problem # 1

Cp. 15 Dynamic Programming.

Rod cutting. Matrix-chain multiplication. Longest common subsequence and

Optimal binary search trees.

Sec. 1 – 5

hw:

Cp. 16 Greedy Algorithms.

Analysis of the greedy method. Huffman codes.

Sec. 1 – 3

hw:

Cp. 22 Elementary Graph Algorithms.

Representations of graphs. Breadth first and Depth first searches. Topological sort and Strongly connected components.

Sec. 1 – 3

Sec. 4, 5 (if time permits).

hw:

Cp. 23 Minimum Spanning Trees.

Prim's and Kruskal's algorithms for minimum spanning trees.

Sec. 1, 2

hw:

Cp. 24 Single-Source Shortest Paths.

Dijkstra's shortest path algorithm.

Sec. 3

hw:

Cp. 25 All Pairs Shortest Paths.

Shortest paths and matrix multiplication.

The Floyd-Warshall algorithm.

Sec. 1, 2 (if time permits).

hw:

Cp. 32 String Matching Algorithms.

Some of Sec. 1 – 4 (if time permits).

hw:

Cp. 34 NP-Completeness

Some of Sec. 1 – 5 (if time permits).

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Course Requirements

Percentage of Grade

Midterm	40%
Final*	40%
Several Programs	20%

*N.B. The Final exam will only cover material from the latter half of the course.

