

CSCI 705 Algorithms

Class

Lectures: Mon, Wed 5:35 PM - 6:50 PM, **ONLINE on ZOOM**

Professor

Saad Mneimneh, **HN 1090L**

Office hours: TBA

Zoom information

Meeting ID: 936 4632 3817

Passcode: Go to Blackboard

Textbooks

Introduction to Algorithms, CLRS

Topics to be covered: Insertion sort, merge sort, asymptotic notation, Strassen's algorithm, Growth of functions, O notation and others, solving recurrences, recursive tree method, substitution method, Master method, Quicksort, randomized algorithms, probabilistic analysis, indicator random variables and expectations, heapsort, sorting in linear time, median and order statistics, hash tables, binary search trees, red black trees, augmenting data structures, dynamic programming, greedy algorithms, amortized analysis, disjoint sets data structure, minimum spanning trees, Krusgal and Prim algorithm, short path algorithms, Bellman-Ford, Dijkstra, all pairs shortest path, Floyd Warshall, difference constraints, BFS, DFS, topological sort, connected components.

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Lectures

- [Lecture 1](#): Insertion sort, pseudocode. Section 2.1 Insertion sort
- [Lecture 2](#): Analysis, asymptotic notation, merge sort, Strassen's alg. Sections 2.2 Analyzing algorithms, 2.3 Designing algorithms, first page of Section 28.2
- [Lecture 3](#): Growth of functions, Chapter 3
- [Lecture 4](#): Solving recurrence equations, recursive tree, substitution method, Master method. Sections 4.1, 4.2, and 4.3.
- [Lecture 5](#): Quicksort, Sections 7.1, 7.2, 7.3, and 7.4
- [Lecture 6](#): Probabilistic analysis, indicator random variables, randomized algs, Sections 5.1, 5.2, and 5.3
- [Lecture 7](#): Mergesort and priority queues using heaps. Chapter 6.
- [Lecture 8](#): Sorting in linear time, counting sort, radix sort, and bucket sort. Chapter 8.
- [Lecture 9](#): Order statistics and the median, Chapter 9 Sections 9.2 and 9.3

- TEST I will be on Wed. Oct 7 during class time 5:35 pm - 6:50 pm.

It will cover subjects in Lectures 1-9 and Homework 1-4.

It will become available at 5:35 pm on BLACKBOARD and will be due on gradescope at 7:15 pm.

- [Lecture 10](#). Hashing. Chapter 11, Sections 11.2 and 11.3.
- [Lecture 11](#). Continue with Hashing, PerfectHashing, open addressing. Chapter 11, Sections 11.4 and 11.5.
- [Lecture 12](#) Binary search trees, chapter 12.
- [Lecture 13](#) Red-black trees and skip lists, Chapter 13, focus on the 3 cases for insertion.
- [Lecture 14](#) Augmenting red-black trees, interval trees. Chapter 14.
- [Lecture 15](#) Dynamic programming, Chapter 15 sections about LCS and optimal BST.
- [Lecture 16](#) Greedy algorithms. Chapter 16 Sections 1 and 2. Chapter 23 Section 1 and Prim's alg. in Section 2.

- **TEST II will be on Wed. Nov. 18 during class time 5:35 pm - 6:50 pm.**

It will cover subjects in Lectures 10-16 and Homework 5-8.

It will become available at 5:35 pm on BLACKBOARD and will be due on gradescope at 7:15 pm.

-[Lecture 17](#) Krusgal's alg. Disjoint sets, Amortized time analysis, Chapter 23 Section 23.2, Chapter 21 Section 21.1, Chapter 17, Sections 17.1, 17.2, 17.3, and 17.4.1.

-[Lecture 18](#) Continue with Amortized Analysis (above).

Homework

[Homework 1](#) Due 9/11/2020

[Homework 2](#) Due 9/18/2020

[Homework 3](#) Due 9/25/2020

[Homework 4](#) Due 10/2/2020

[Homework 5](#) Due 10/16/2020

[Homework 6](#) Due 10/30/2020

[Homework 7](#) Due 11/6/2020

[Homework 8](#) Due 11/13/2020

Grading policy

- Homework 20%

- Test 1 20%

- Test 2 20%

- Final 30%

- Report 10%