

# CSc 220: Algorithms

**Instructor:** Rosario Gennaro

**Office Hours:** Tuesdays, 2-4pm in Shepard 279

**Course Webpage:** <http://www-cs.ccny.cuny.edu/rosario/csc220/>

**Textbook:** Introduction to Algorithms by T. Cormen, C. Leiserson, R. Rivest and C. Stein.

**Grading:** The grade will be computed as follows: 25% on the final exam, 25% each for two in-class midterm exams, and 25% on the homework. Class participation will be a factor in your grade as well.

**Homework:** Homework will be assigned (almost) weekly, tentatively on the schedule listed below. Each problem in the homework should be done on a separate sheet of paper, marked with your name and the course number. Collaboration is allowed and actually encouraged, but students must write up solution on their own and return individual solutions. Moreover you are required to acknowledge your collaborators. Similarly you are allowed to research solutions on the Internet or any other sources, but again you must acknowledge them.

Homework will be graded according to two criteria: (i) correctness of the solution; (ii) clarity of the presentation. It is important that you put effort not only in reaching a correct solution to the problems assigned to you, but also in explaining it in very clear and simple terms.

**A note about coding:** This is a theoretical class which is aimed at developing your problem-solving and communication skills. As such there will be no coding assignments, but you are certainly encouraged to try to code some of the algorithms we will see in class and in the homework, as it can lead to a better understanding.

## Tentative Course Schedule

**Tuesday August 29:** Introduction and Administrivia. Algorithms and their analysis. Correctness and Efficiency. Asymptotic Notation. Simple sorting algorithms.

**Thursday August 31:** More sorting algorithms. Divide and Conquer. Quicksort. Recurrences. Homework 1 out.

**Tuesday September 5:** Probability, Randomized Algorithms, Randomized Quicksort.

**Thursday September 7:** Sorting: Heaps and Priority Queues. Homework 1 due. Homework 2 out.

**Tuesday September 12:** Sorting lower bounds. Sorting in linear time (radix sort, bucket sort).

**Thursday September 14:** Median and other statistics. Homework 2 due. Homework 3 out.

**Tuesday September 19:** Data Structures. Hash tables. Universal Hashing.

**Thursday September 21:** NO CLASS

**Tuesday September 26:** Data Structures. Search on Trees.

**Thursday September 28:** Data Structures. Balanced Trees. Homework 3 due. Homework 4 out.

**Tuesday October 3:** Dynamic Programming.

**Thursday October 5:** Dynamic Programming. Homework 4 due.

**Tuesday October 10:** First Midterm

**Thursday October 12:** Greedy Algorithms. Homework 5 out.

**Tuesday October 17:** Graph Algorithms: breadth-first and depth-first search. Topological sort.

**Thursday October 19:** Graph Algorithms: shortest path. Homework 5 due. Homework 6 out.

**Tuesday October 24:** Graph Algorithms: all pairs shortest path.

**Thursday October 26:** Network Flow. Homework 6 due. Homework 7 out.

**Tuesday October 31:** Network Flow.

**Thursday November 2:** String Matching. Homework 7 due.

**Tuesday November 7:** Second Midterm

**Thursday November 9:** Algebraic Algorithms: Polynomial Evaluation, Polynomial Multiplication, Discrete Fourier Transform. Homework 8 out.

**Tuesday November 14:** Fast Fourier Transform.

**Thursday November 16:** Number Theoretic Algorithms: GCD. Modular Arithmetic Homework 8 due. Homework 9 out.

**Tuesday/Thursday November 21, 23:** NO CLASS

**Tuesday November 28:** Number Theoretic Algorithms: Chinese Remainder Theorem.

**Thursday November 30:** Primality Testing. Homework 9 due. Homework 10 out.

**Tuesday December 5:** Cryptography.

**Thursday December 7:** Big Data Algorithms. Homework 10 due.

**Tuesday December 12:** A word on NP-completeness and approximation algorithms