Computer Science CSc22000 Syllabus

Fall 2019

Meetings

Monday and Wednesday, 12.30pm - 1.45pm, NAC 5/123

Instructor

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Office hours

Tuesday 11.00am-12.00pm NAC7/101

Description

This course focuses on the fundamental study of algorithms– defined sequences of computations applied to solve a wide range of computer applications. The course catalog describes. Measuring algorithmic complexity (O-Notation); searching and sorting algorithms and their complexity; tree and graph algorithms and their complexity; classes of algorithms, such as divide-and-conquer, backtracking, greedy, probabilistic, etc. Computational complexity; the classes P and NP.

Course goals

1. Knowledge of how to specify and determine algorithm behavior,

2. Knowledge of how to compare the advantages and limitations of distinct algorithms that perform the same task,

3. knowledge of some classes of algorithmic paradigms, e.g. divide and conquer, greedy, etc.

Textbook

Required: Introduction to Algorithms (Second Edition) by Cormen, Leiserson, Rivest, and Stein, McGraw-Hill (2001).

This book is similar to the first edition, so you could probably get by with only the first edition. It's a text book you will always need, so it's best for you to buy it. Since the written assignments will be from the textbook and also students are expected to read the upcoming chapter before the class.

Evaluation

Your final grade will be calculated as follows:
`Homework (25%) + Midterm (30%) + Final (35%) + Class Participation (5%) + Attendance (5%)`

Programming Exercises and Written Assignments

There will be at least 3 programming exercises as well as written assignments. Assignments are always due at the beginning of class on the due date, or the deadline mentioned on the assignment paper. if there is no class that day on the deadline the next class will be the deadline. Assignments one day late subtract `10%`; two days late loses `30%`. After 2 days the assignment will be considered a zero.

Midterm Exam

There will be one midterm exam that students are required to take. Make-up exams will not be given. If there is an extreme condition, documented, you can discuss with the instructor.

Final Exam

The final exam will be on Dec 16.(This date is subject to change by the Registrar's Office). It is the responsibility of each student to be available at the time of the examination. You must take the final exam in order to pass the course.

Class participation

Every student is expected to ask questions, and participate in the class. I encourage you to present problems, contribute your ideas and insights, and ask questions.

Attendance

You are expected to attend all classes and are responsible for all the material covered. Attendance is required and will be taken at the beginning of each class. Lateness and students leaving before the end of the class period will be recorded. If you arrive late, you are responsible for letting me know at the end of the class. Students are responsible for obtaining all the information from classes that they miss with classmates as soon as possible. Along with class participation this will affect your grade `5%`.

Academic Integrity

Academic dishonesty is prohibited in The City University of New York and at the City College of New York and is punishable by penalties, including failing grades, suspension, and expulsion. The complete text of the College policy on Academic Integrity may be found in the catalog. Any kind of plagiarism (copy-paste codes from the internet, submitting the same project by changing the structure, getting/hiring someone to do it etc.) is strictly forbidden and will be reported to the department immediately.

Preparation

You are expected to come to class having already completed the reading and having looked at the textbook practice problems for the upcoming lesson. By studying the material before each class you will be ready to discuss the material in more depth and have specific questions to ask about parts of the material that may be giving you difficulty.

Schedule

Lecture
Course Overview; Growth of Functions; Asymptotic Notation; Insertion Sort
Divide-and-Conquer; Mergesort; Solving Recurrences by Recursion-Tree
Divide-and-Conquer for Maximum Subarray; Matrix Multiplication
Heapsort; Priority Queue
Priority Queue con't; Quicksort
Sorting Lower Bound and Beyond
Sorting Lower Bound and Beyond con't
Red-Black Trees
Red-Black Trees con't
B-Trees
B-Trees con't
Dynamic Programming
Matrix Chain Multiplication
Dynamic Programming for Longest Common Subsequence
Greedy Algorithms
Huffman Coding
Review before midterm
Midterm exam
Graph Theory; BFS and DFS in Graphs
Graph Theory; BFS and DFS in Graphs con't
Prim's algorithm; Kruskal's algorithm
Topological Sort; SCC
Minimum Spanning Trees
Single-Source Shortest Paths; Single-Source Shortest Paths for DAGs
All-Pairs Shortest Paths; Floyd-Warshall Algorithm
NP-completeness;P;NP;NP-complete
NP-completeness;P;NP;NP-complete con't
Review before the final exam
Final exam