CS 344 - Design and Analysis of Algorithms - Spring 2021
Section 5,6,7,8

Canvas All announcements, assignments, and resources will be posted on Canvas.

1 Course Details

Time and Location

- The course will be taught online. I will post a zoom link via Canvas announcements.
- time of lecture: Mondays and Wednesdays, 5:00pm - 6:20pm

Instructor

- Name: Aaron Bernstein
- Office: CoRE 306
- email: aaron.bernstein@rutgers.edu

Recitations

1. Section 5: Thursday 5:15-6:10pm
2. Section 6: Monday, 6:55-7:50pm
3. Section 7: Monday, 8:25-9:20pm
4. Section 8: Monday, 10:35-11:30 am

Recitation Instructors TBA

Office Hours You can (and are encouraged to!) come to the office hours of any of the TAs – they do not have be the instructor of your recitation section.

Office hours times will be posted soon.

Online Format The course will be taught entirely online. Lecture videos will be recorded and I will also post succinct lecture notes for each lecture.

I will communicate with the class via Canvas announcements, so I highly recommend setting up automatic email notifications.

Coursebooks:

- Required: CLRS – Introduction to algorithms by Cormen, Leiserson, Rivest and Stein, 3rd Edition.
- Useful Resource: https://jeffe.cs.illinois.edu/teaching/algorithms/

I will refer to the sections of CLRS, but WILL NOT directly follow the flow of the contents. Students are responsible for knowing all the material that is covered in class but not in the book (a lot). I will provide succinct notes for what was discussed in each lecture.

Prerequisites

- CS 112 Data Structures
- CS 206 Introduction to Discrete Structures II (or equivalent)

Knowledge of basic concepts of programming and data structures is assumed (*e.g.* lists, stacks, queues, trees) as well as basic mathematics (e.g. proof by induction, linearity of expectation, permutations, logarithms, the basics of solving recurances, and asymptotic (i.e. "big-oh", "big-omega") notation).

2 Course Material

This course will cover fundamental techniques for designing efficient combinatorial algorithms and mathematical methods for analyzing their complexity. Below is a highly tentative list of some of the material covered

- General mathematical background, definition of concepts such as algorithm correctness, complexity, asymptotics.
- Divide and conquer, recurrences, Master Theorem

- Sorting. Lower bounds for comparison sorting.
- Linear-time Selection, Integer Multiplication
- Basic graph algorithms: graph exploration, minimum spanning tree, shortest paths, and others.
- Other Possible Topics: dynamic programming, greedy algorithms, priority queues, hashing.

3 Assignments

Homework:

1. You may discuss HW with anybody in the class, but you may not assist each other with the actual writing in any way. You may NOT consult people outside the class, or any outside material (e.g. solutions to related exercises, or any web sources).
2. ALL ASSIGNMENTS MUST BE SUBMITTED ONLINE VIA Canvas. Instructions will be given in class. No physical submissions please.
3. For the most part there will be one HW assignment every two weeks
4. Your *two* lowest homework grade will be dropped.
5. NO LATE HOMEWORK WILL BE ACCEPTED.

Exams: There will be two exams. They will both be take-home and you will have 24 hours to complete them. Both exams will take place on class day (and there will be no class that day), so that you will be guaranteed slot in your schedule during which to work on the exam.

1. Exam 1 (in class): Wednesday March 10
2. Exam 2 (in class): Monday May 3

The only acceptable reason for not attending an exam is a major (documented) medical emergency. If such a reason is given, there will be no makeup for in-class exams; instead, the rest of your assignments will count proportionally more towards your grade.

4 Grading

Individual assignments will only be given a number grade, not a letter grade. The final letter grade will then likely be assigned on a curve. I will let you know the average score on each assignment, so that you can have a sense of how you are doing with respect to the rest of the class.

Homework : Your homework grade is calculated by dropping your lowest *three* assignment grades, and then averaging the rest.

Submitted homework that is hand-written must be very clearly legible. TAs may at their discretion give reduced or even no credit for assignments that are hard to read. *Each homework assignment will receive 4% extra credit if it is typewritten* – so an original score of 60% would be increased to 64%.

Leaving a Problem Blank: On any assignment (homework or exam), you can either attempt to answer the question, in which case you will receive between 0 and 100% credit for that question (partial credit will be given to answers that have most of the right ideas), or you can write "I don't know", in which case you receive 25% credit for that question. It is possible to get less than 25% credit for a question that you answer erroneously. This policy does not apply to extra credit problems: if you answer "I don't know" on an extra credit question you get 0%.

Final Score Calculation (tentative – subject to change)

- HW: 70%
- Exam 1: 15%
- Exam 2: 15%

Participation Grade: Your final grade may be adjusted by +/- 5% points at the discretion of the instructor and the TAs. However, such adjustments are pretty infrequent – the majority of participation grades will be 0 (no adjustment). A positive participation grade is typically given for active presence in recitation, and for helping other students with the material in recitation/office hours/piazza. A positive grade may also be given for marked improvement in performance as the course progresses. Negative participation grades are very rare.

Academic Integrity: you may not consult outside sources on HW or tests, including any web sources, or anybody outside the class. You may discuss the homework with any other in the class, but you may not help each other with the writeup. On the front page of the homework assignment, you must write the names of everybody that you discussed that assignment with.

A severe penalty will be given to any assignment which indicates collusion or cheating. The usual penalty for cheating on an assignment or an exam is failure in the course. Please contact me or one of the TAs in advance if you are not sure what qualifies as cheating. You can also see Rutgers Policy at http://judicialaffairs.rutgers.edu/academic-integrity.