CS 301: Algorithms  
Fall 2023

Lectures: Wed 17:40–18:30, Fri 14:40–16:30 (FENS G077)  
Recitations: Wed 18:40–19:30 (FASS G032, UC G030)  
Instructor: Esra Erdem  
TAs: Müge Fidan, Baturay Yılmaz  
LAs: TBA

Course description. This course is about the analysis and design of computer algorithms. We will study various methods to analyze the correctness and asymptotic performance of algorithms, important algorithms (e.g., search, sort, path finding, spanning tree, network flow) and data structures (e.g., dynamic sets, augmented data structures), algorithmic design paradigms (e.g., randomized, divide-and-conquer, dynamic programming, greedy, incremental), and hardness of problems (e.g., NP-completeness, reductions, approximation algorithms).

Course objectives. To prepare students 1) to analyze an algorithm’s performance by asymptotic analysis methods, 2) to understand the role of data structures and programming paradigms on the performance of algorithms, 3) to understand a computational problem and its hardness, and 4) to design efficient algorithms taking into account these important factors.

Prerequisites. A strong understanding of programming and data structures (e.g., CS300), and a solid background in discrete mathematics and probability (e.g., MATH204) are necessary for this course.

Lectures and Recitations. Students are expected to attend the lectures and the recitation sessions every week.

Textbook. We will study “Introduction to Algorithms” (3rd edition) by Cormen, Leiserson, Rivest and Stein.

Homework. There will be five assignments: A1, A2, A3, A4, A5. Each student should write up the solutions on her/his own and should be able to explain the solutions to the instructor and/or the teaching assistants during the demo sessions. Late submissions will not be accepted.

Quizzes. Quizzes will be given in class during the lectures. Attendance will be taken during the quizzes.

Exams. There will be two exams: one midterm (E1) and one final examination (E2). There will be only one make-up exam (to be considered instead of one missing exam): it will be given on the next business day after the final exam, and only if requested with an official report before the final exam. In the exams, students are responsible for the material presented in lectures and recitations, and covered in the assignments.

Grading. Grades will be determined by the assignments (25%) and the exams (75%). Assignments A1, A2, A3, and A5 will contribute equally (18%), whereas assignment A4 will contribute more (7%) as it involves programming. The quizzes will contribute equally to your overall grade (2%) as a bonus. Exams E1 and E2 will contribute 35% and 40%, respectively.