

# CS 301: Algorithms

## Spring 2021

**Lectures:** Monday 13:40–15:30, Tuesday 10:40–11:30

**Recitations:** Wednesday 17:40–18:30

**Instructor:** Esra Erdem (esra.erdem@sabanciuniv.edu)

**Office hours:** Tuesday 12:40–13:30

**Teaching Assistants:** Aysu Boğatarkan (Monday 15:40–16:30), Selin Eyüpoğlu (Wednesday 12:40–13:30), Berk Yağlıoğlu (Tuesday 17:40–18:30)

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**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., searching, sorting, path finding) and data structures (e.g., dynamic sets), algorithmic design paradigms (e.g., randomized, divide-and-conquer, dynamic programming, greedy), and hardness of problems (e.g., NP-completeness).

**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, and 3) 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. Other study materials (e.g., homework problems, readings) will be handed out in class or posted at SUCourse.

**Homework.** There will be four assignments: A1, A2, A3, A4. One of the assignments (A3) will involve programming. The students are encouraged to collaborate with each other to understand and solve the problems. However, 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 almost every week during lectures.

**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 and quizzes (25%), and the exams (75%). You may get an NA for CS301 if you miss at least 40% of the quizzes and the final exam. The assignments A1, A2 and A4 will contribute equally, whereas the assignment A3 will contribute more. The quizzes will contribute equally; two of them with the least grades will be dropped. The exams E1 and E2 will contribute 35% and 40%, respectively.

**Important.** For online courses, written/oral exams, quizzes, and assignment demo sessions, the students are responsible in securing a reliable internet connection, a camera, and an audio recorder. The students must attend the synchronous Zoom lectures, recitations, etc. and real-time online exams with their SU email account.