Course Syllabus: Design and Analysis of Algorithms

Department of Computer Science and Engineering
Fall, 2020

CID	Name	Credit	Instructor	Office
ELE3034	Design and Analysis of Algorithms	3	Prof. Tae-Hyung Kim	Eng. Bldg. 3 - 508

- Class Overview

  This course will be taught in Korean. One final exam and a few homeworks will be assigned to determine your final grade. You are excused of your absence in the class up to three times for the semester. After the fourth absence, your final score will be degraded proportionally. If you miss more than one third of the total lectures, you are not allowed to take the final exam. No excuses are accepted. Academic dishonest activity will be terminally punished. This course is a lecture-based class, so I the lecturer will talk most of time in the class, but your active class participation is highly encouraged in any forms. Especially if lectures are too easy, too hard, too fast, too slow, just let me know promptly via e-mail. Then I will do my best to live up to your expectation promptly. E-mail is the best way to reach me.

- Course Overview

  Design and analysis of algorithms is the core area in every aspects of computer science. When we are supposed to solve a problem using a computer, there are a series of questions that we would like to know in advance like "can we solve it?", "if we can, how efficient?", "if we can't, how hard is the problem?", and "if it turns out to be a hard problem, is there any way to cope with it?", etc. In this course, we will deal with the fundamentally orthodox answers for these kinds of questions in solving a problem.

  The goal is to understand the essence of algorithmic efficiency and five classical approaches in designing computer algorithms like divide-and-conquer, dynamic programming, the greedy approach, backtracking and branch-and-bound. And then, we would like to understand the theory of computational complexity using well-known sorting and searching problems. You will know the true meaning of lower bound of an algorithm. Finally, you will understand why we need to have the theory of NP in dealing with many intractable problems. Then you will get the answers for the five or more questions presented in the course overview.

- Evaluation

  Final(80%) + Homework and Class participation (20%)

- Textbook

  1. Foundations of Algorithms, 5th Ed, Richard Neapolitan.
     ISBN-13: 978-1284049190
     ISBN-10: 1284049191

- Contact

  – Office: Eng. Bldg. 3 - 508

  – You may directly contact me at *taehyung@hanyang.ac.kr*.

- Schedule

Week	Topics	Contents in Text
1	Introduction to algorithms	Chap. 1
2	Introduction to efficiency and order	Chap. 1
3	Divide and Conquer Algorithm (part 1)	Chap. 2
4	Divide and Conquer Algorithm (part 2)	Chap. 2
5	Dynamic Programming	Chap. 3
6	Greedy Algorithm (part 1)	Chap. 4
7	Greedy Algorithm (part 2)	Chap. 4
8	Midterm	
9	Backtracking (part 1)	Chap. 5
10	Backtracking (part 2)	Chap. 5
11	Branch and Bound (part 1)	Chap. 6
12	Branch and Bound (part 2)	Chap. 6
13	Computational complexity: the Sorting problem (part 1)	Chap. 7
14	Computational complexity: the Searching problem (part 2)	Chap. 8
15	Complexity and Intractability: the theory of NP	Chap. 9
16	Final	