

Dongseo University

Division of Computer Engineering

Data Structure and Algorithm

Instructor(s): LEE, Young Sil / Ph.D.

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Classroom: TBD

Class Time: TBD

Office Hours: 09-18

Course Description:

This course covers the modern theory of algorithms, focusing on the themes of efficient algorithms and intractable problems. Besides introducing the basic language and tools for algorithm analysis, we will also cover several specific problems and general design paradigms. We will also examine heuristic techniques often used in practice, even though in many cases formal theoretical results are not known.

We will focus on the theoretical and mathematical aspects in class and in the homework assignments. As you can see from the preliminary list of topics (included below), we will be covering a great deal. I expect the course to be challenging, both in terms of the workload and the difficulty of the material. You should be prepared to do a lot of work outside of class. The payoff will be that you will learn a lot of useful and interesting things.

This is a three-credit course and is offered during the autumn semester, which is a 15-week term.

Course Goals & Objectives:

At the conclusion of this course, the successful (passing) students will be able to

- Understand fundamental data structures and algorithms and the tradeoffs between different implementations of these abstractions.
- Implement and apply theoretical analysis
- Lists, stacks, queues, heaps, dictionaries, maps, hashing, trees and balanced trees, sets, and graphs.
- Search and store algorithms.

Course Outline:

- **Week 1 Course Introduction**
- **Week 2 Review: arrays, simple linked lists, binary trees**
- **Week 3 Stacks and queues**

- **Week 4 Sets, including union/find algorithms**
- **Week 5 Recursion and backtracking**
- **Week 6 Sorting and searching**
- **Week 7 Balanced trees**
- **Week 8 Mid-Term Week**
- **Week 9 Heaps, priority queues, heapsort**
- **Week 10 Dictionaries/maps, hashing**
- **Week 11 Randomized Algorithm**
- **Week 12 Graphs**
- **Week 13 NP-completeness review**
- **Week 14 Novel approaches to NP-complete problems**
- **Week 15 Final Week**

Topics won't be presented strictly in this order, since some of the themes such as complexity and recursion will reappear as we discuss their application to different data structures throughout the course.

Textbook(s)

- Required: Introduction to Algorithms, by Cormen, Leiserson, Rivest, and Stein.
- Recommended: Recent references available at JUST university library

Class Website: e-Class

Course Assignments & Grading:

- *Exams:*
 - There will be a mid-term exam, containing a set of questions, in week 8 of the lecture period (30% of final grade) and a final exam in week 15 (30% of final grade). The two exams count for 60% of the total final course grade.
- *Attendance:*
 - Attendance is mandatory. You will not be able to take the final exam if you miss more than 3 classes (see the Course policy).

- *Assignments:*
 - All assignments must be turned in on the due date. Late assignments will not be accepted.
 - All written assignments should be typed, double-spaced, using 12-point font. No hand-written assignments will be accepted.
 - We will use e-class on occasion for posting lecture announcements.
- *Grading scale:*
 - 91-100% = A+
 - 81-90% = A
 - 71-80% = B+
 - 65-70% = B
 - 61-64% = C+
 - 55-60% = C
 - 50-54% = D

Grading Policies:

Your course grade will be based on the following breakdown:

Homework Assignments	30%
Attendances	10%
Midterm Exam (usually 8th week, in class)	30%
Final Exam (usually 15th week)	30%

Letter grades are subject to the instructor's evaluation of overall lecture performance, but there will not be a curve. Questions or appeals about assignment grades should be directed to the head TA, and must be made within one week of the graded assignment being returned. If you are not satisfied with the TA's resolution, you must submit a written appeal to the instructor via e-mail within two days of your discussion with the TA.

Course Policies:

- **Attendance:** Events such as illness, injury, or job or graduate school interviews, are expected to occasionally prevent students from attending lectures. However, students who regularly fail to attend 3 lectures will be penalized (see the Grading policy). You are responsible for all material presented while you are absent.
- **Academic Misconduct Policy:**