Extended Syllabus

Course Title	알고리즘 설계와 분석	Semester	Fall 2023
Credit	3	Course Number	CSE3081
Class Time	Tue, Thu 13:30-14:45	Enrollment Eligibility	Students who have taken prerequisite courses

Instructor's Photo	Name: Jungmin So	Homepage: icslsogang.github.io
	E-mail: jso1@sogang.ac.kr	Telephone: 02-705-8481
	Office: AS1013 Office Hours: TBD	

※ 홀수 학번 중에서 알고리즘 설계와 분석 2분반이 타 강의와 겹쳐 수강할 수 없는 경우에, 7, 8학기 (9학기 이상 포함) 학생들은 본 분반에 수강을 허용하도록 하겠습니다. 9월 5일 화요일 첫 수업 이후에 자신이 7학기 이상임을 확인할 수 있는 서류와 수강허가서를 가지고 저를 만나주시기 바랍니다. 6학기 이하의 홀수 학번의 경우에는 너무 많은 수강생으로 인하여 본 분반에서 수용이 어려우니 이해해주시기 바랍니다.

※ 이 분반은 짝수 학번[2, 4, 6, 8, 0]을 위한 분반입니다. 홀수 학번은 2분반으로 수강 신청을 해주시기 바랍니다. 수강 학생이 매우 많아서 추가로 수강을 허용하기가 어려운 상황입니다. 알고리즘 설계와 분석은 1, 2학기 모두 개설되는 과목이니 졸업 학기가 아니고 수강 신청을 못한 경우에는 다음 학기에도 수강할 수 있습니다.

Ⅰ. Course Overview

1. Description
This course is a follow-up course to Data Structures (CSE3080), where we learn to design various algorithms in order to solve problems in an efficient way. The most important activities in solving a problem are designing an efficient algorithm, and deciding on the right data structure to implement the algorithm. In this course we explore some of the well-known algorithms that are applied to many different computer science problems, and practice designing and implement our own algorithms.
2. Prerequisites
- Students must have taken CSE3080 (Data Structures) - Students must be able to write programs in C/C++

3. Course Format (%)

Lecture	Discussion	Experiment/Practicum	Field study	Presentations	Other
100%	%	%	%	%	%

4. Evaluation (%)

mid-term Exam	Final exam	Quizzes	Presentations	Projects	Assignments	Participation	Other
30%	30%	%	%	%	30%	10%	%

Ⅱ. Course Objectives

This course builds on C/C++ programming skills learned in the first grade and data structures and techniques learned in the second grade. Using those skills, the students learn to design and implement algorithms, and evaluate their performance. At the end of this course, the students will:

- be able to analyze computer science problems and design algorithms to solve them
- be able to evaluate cost of running the algorithms
- be able to implement algorithms using C/C++

Solving problems is a fundamental skill of a software engineer, and you will constantly be using the algorithms learned in this course in your career.

Ⅲ. Course Format

(* In detail)

- In the class, lectures on the theory of algorithm design will be given.
- Techniques for implementing algorithms and using data structures will be discussed in class as well. We will use C/C++ as the programming language.

Ⅳ. Course Requirements and Grading Criteria

- mid-term and final exams
- In-class quizzes
- programming assignments
- homeworks

Ⅴ. Course Policies

- University regulations will be applied to the course.
- Copying is strictly prohibited; if one student copies another student, both will be given a score of zero.

VI. Materials and References

- Lecture slides (could be downloaded before lecture from cyber.sogang.ac.kr)
- Introduction to Algorithms, 4th/3rd Edition, Cormen, Leiserson, Rivest and Stein, MIT Press.

Ⅶ. Course Schedule

(* Subject to change)

Week 1	**Learning Objectives**	
	Topics	Introduction (Chapter 1, 2) Characterizing Running Times (Chapter 3)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 2	**Learning Objectives**	
	Topics	Divide-and-Conquer Algorithms (Chapter 4)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	

Week 3	**Learning Objectives**	
	Topics	Probabilistic Analysis and Randomized Algorithms (Chapter 5)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 4	**Learning Objectives**	
	Topics	Sorting and Order Statistics (Chapter 6-9)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 5	**Learning Objectives**	
	Topics	Red-Black Trees (Chapter 13)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 6	**Learning Objectives**	
	Topics	Dynamic Programming (Chapter 14)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	

Week 7	**Learning Objectives**	
	Topics	Greedy Algorithms (Chapter 15)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 8	**Learning Objectives**	
	Topics	
	Class Work (Methods)	Midterm Exam
	Materials (Required Readings)	
	Assignments	
Week 9	**Learning Objectives**	
	Topics	B-Trees (Chapter 18)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 10	**Learning Objectives**	
	Topics	Maximum Flow (Chapter 24)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	

Week 11	**Learning Objectives**	
	Topics	Matchings in Bipartite Graphs (Chapter 25)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 12	**Learning Objectives**	
	Topics	Linear Programming (Chapter 29)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 13	**Learning Objectives**	
	Topics	Machine Learning Algorithms (Chapter 33)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 14	**Learning Objectives**	
	Topics	NP-Completeness (Chapter 34)
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	

Week 15	**Learning Objectives**	
	Topics	Selected Topics / Review
	Class Work (Methods)	Lecture
	Materials (Required Readings)	
	Assignments	
Week 16	**Learning Objectives**	Final Exam
	Topics	
	Class Work (Methods)	
	Materials (Required Readings)	
	Assignments	

Ⅷ. Special Accommodations

None

IX. Aid for the Challenged Students

Challenged students are encouraged to meet with the instructor for any special aids needed to take the course.