Algorithms

Course Name	Course type (credit/hours)	Required course(3/3)	Course code	F057
	Target students Division/major/grade	Software and Computer Engineering/Sophomore	Opening semester	2021 2ND SEMESTER
	Class time and classroom	Mon C(Pal1025)Wed C(Pal1025)	English Grade	A(100%English)

Reference to this course	Prerequisite courses	Data Structure
	Related basic courses	Discrete Mathematics
	Recommended concurrent courses	Artificial Intelligence
	Related advanced courses	Theory of Computation

Instructor	Name (title/division)		Yenewondim Biadgie.S(Assistant Professor, Software and Computer Engineering)			
	Office Room Number	Paldal 1011	Office phone Number	3857	e-mail	
	Office hours		Homepage address			
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

1. Introduction

This course deals with principles and techniques for design and analysis of computer algorithms. The topics covered are mathematical induction, asymptotic analysis of algorithm efficiency, and algorithm design techniques including divide-and-conquer, dynamic programming, greedy method, branch-and-bound, backtracking, and iterative improvements. Elements of computational complexity theory, mostly on NP-completeness, is introduced and it is also discussed how to cope with computationally intractable problems.

2. Course Objectives

- Develop the ability to design and analyze efficient algorithms.

3. Class types and activities

Mostly lectures.

Assignments consist of exercise problems on algorithm efficiency analysis, algorithm designs, and algorithm correctness. Students are supposed to invest considerable amount of time to understand course material and to solve assigment problems.

4. Teaching Method

- [V] lecture
- [ ] team project(presentation and case studies)
- [ ] designing and production
- [ ] others
- [ ] discussion and debate
- [ ] experiments(role-playing,etc)
- [ ] on-site learning(on-site training)

5. Support Systems in Use

- [V] AjouBb
- [ ] cyber lecture
- [ ] class behavior analyazing system
- [ ] automatic recording system
- [ ] online content
- [ ] others
- [ ] web-based assignment

6. Teaching Tools

- [ ] PBL(Problem Based Learning)
- [ ] UR(Undergraduate Research)
- [ ] others
- [ ] CBL(Case Based Learning)
- [ ] FL(Flipped Learning)
- [ ] TBL(Team Based Learning)
- [ ] DSAL(Data Science Active Learning)

7. Knowledge and ability required for taking this course

prerequisite knowledge: computer programming, discrete mathematics, data structures

tools: C language, ability to read textbook written in English.

Basic knowledge: Computer Programing, Discrete Mathematics, Data Structure

Capability: The C programing language, Ability to read and understand English textbooks

8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance		5%	
midterm exam	1	35%	
final exam	1	40%	
quiz			
presentation			
discussion			
homework	6	20%	
etc			
study hours			

9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Main	Introduction to the Design and Analysis of Algorithms, 3rd Edition,	Anomy Levitin	Pearson	2012
	Foundations of Algorithms , 5th Edition,	Richard Neapolitan	Jones and Bartlett	2015

10. Class system and Class shedule

In the beginning of the course, concepts of algorithms, mathematical induction, asymptotic analysis are taught. The algorithm design techniques including dive-and-conquer, dynamic programming, greedy method, and iterative improvements. Then the students
will learn problems that do not have efficient algorithms, and how to cope with such problems.

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Introduction : Algorithm of a problem, Parameters of a Problem and an Instance of a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures		

< Class Schedule >

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
2	Analysis of Algorithm Efficiency: Time Complexity and Space Complexity		Yenewondim Biadgie.S	Multimedia Utilization Lectures	Report Evaluation	
3	Divide-and-Conquer Algorithm Design Methodology to Solve a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures		
4	Dynamic Programming Algorithm Design Methodology to Solve a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures	Report Evaluation	
5	Dynamic Programming Algorithm Design Methodology to Solve a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures		
6	Greedy Algorithm Design Methodology to Solve a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures	Report Evaluation	
7	Greedy Algorithm Design Methodology to Solve a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures		
8	Midterm Exam		Yenewondim Biadgie.S			
9	Backtracking Algorithm Design Methodology to Solve a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures		
10	Backtracking Algorithm Design Method/Branch-and-Bound Algorithm Design Methodology		Yenewondim Biadgie.S	Multimedia Utilization Lectures	Report Evaluation	
11	Branch-and-Bound Algorithm Design Methodology to Solve a Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures		
12	Lower Bounds of Sorting Problem by Comparison/ Distribution		Yenewondim Biadgie.S	Multimedia Utilization Lectures	Report Evaluation	
13	Lower Bounds of Selection Problem		Yenewondim Biadgie.S	Multimedia Utilization Lectures		
14	Intractable Problems/NP-Hard Problems		Yenewondim Biadgie.S	Multimedia Utilization Lectures	Report Evaluation	
15	Handling NP-hard Problems		Yenewondim Biadgie.S	Multimedia Utilization Lectures		
16	Final Exam		Yenewondim Biadgie.S			

11. Other items of notification