Data Structures

Course Name	Course type (credit/hours)	Elective course(3/3)	Course code	M011
	Target students Division/major/grade	Digital Media/Sophomore	Opening semester	2020 2ND SEMESTER
	Class time and classroom	Tue C(IUCB103)Fri C(IUCB103)	English Grade	A(100%English)
Reference to this course	Prerequisite courses	컴퓨터프로그래밍및실습		
	Related basic courses			
	Recommended concurrent courses			
	Related advanced courses	알고리즘		

Instructor	Name (title/division)	Teemu H. Laine(Associate Professor, Digital Media)				
	Office Room Number		Office phone Number		e-mail	
	Office hours	Mon/Wed 9:30-11:30	Homepage address			
Teaching Assistant	Name (title/division)					
	Office Room Number		Office phone Number		e-mail	

1. Introduction

This Data Structures course handles basic techniques for creating and manipulating data structures that are required for efficient management of data within a computer system. Students explore and examine various types of data structures including lists, stacks, queues, trees, and graphs. They also study the related algorithms such as selection, searching, sorting, and their complexity analysis. An efficient program is mainly based on efficient data structures and algorithms. Therefore, this class is fundamental in order for students to become a good programmers.

2. Course Objectives

[Educational Goal]
Understand the basic data structures necessary for writing efficient software.
Design and analyze various algorithms using specific data structures, and improve your programming ability.

[Learning outcomes]
Understand common data structures, their advantages and disadvantages in order to implement efficient software.
Understand typical algorithms that are used with the data structures.

3. Class types and activities

We briefly review the basic concepts of various types of data structures such as array, lists, stacks, trees, graphs, etc. We also examine their related algorithms and analysis techniques to measure the efficiency.

Learning content will be presented through online lectures (recorded or live). Additionally, there will be problem-solving sessions (online) where the professor uses the theoretical concepts presented in online lectures to solve problems. Students will be given opportunities to ask questions and discuss during these problem-solving sessions.

Several homework assignments will be assigned for hands-on learning. Quizzes may also be used to increase students level of understanding.

4. Teaching Method

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

5. Support Systems in Use

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

6. Teaching Tools

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

7. Knowledge and ability required for taking this course

You must be able to write basic programs using a computer programming language. If you know the general programming language usage principles rather than understanding a specific programming language, there is no problem in class progression. If you know the principles of object-oriented programming, it will be very helpful.

8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance			
midterm exam	1	30	Paper exam
final exam	1	40	Paper exam
quiz			
presentation			
discussion			
homework	10	30	Programming assignments, etc
etc			
study hours			

9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Main	Data Structures and Algorithms in Python	Goodrich, Tamassia, Goldwasser	Wiley	2013

10. Class system and Class shedule

Data structures
- Arrays and lists
- Queues and stacks
- Trees, Hash tables
- Search tree structures
- Graphs

Algorithm analysis
- Algorithm analysis
- Recursion
- Divide and conquer
- Sorting and searching

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Course introduction and programming language basics	K	Teemu H. Laine	강의		

< Class Schedule >

* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
2	Time complexity and algorithm analysis	K	Teemu H. Laine	강의	과제	
3	Recursion	K	Teemu H. Laine	강의	과제	
4	Linked lists	K	Teemu H. Laine	강의	과제	
5	Stacks and queues	K	Teemu H. Laine	강의	과제	
6	Trees and binary trees	K	Teemu H. Laine	강의	과제	
7	Heaps	K	Teemu H. Laine	강의	과제	
8	Mid-term exam	K	Teemu H. Laine	시험	중간고사(30%)	
9	Binary search tree and AVL tree	K	Teemu H. Laine	강의	과제	
10	2-3-4 trees, red-black trees, b-trees	K	Teemu H. Laine	강의	과제	
11	Hash tables	K	Teemu H. Laine	강의	과제	
12	Sorting algorithms 1	K	Teemu H. Laine	강의	과제	
13	Sorting algorithms 2	K	Teemu H. Laine	강의	과제	
14	Graphs 1	K	Teemu H. Laine	강의	과제	
15	Graphs 2	K	Teemu H. Laine	강의	과제	
16	Final exam	K	Teemu H. Laine	시험	기말고사(40%)	

11. Other items of notification