

## Theory of Computation

Course Name	Course type (credit/hours)	Elective course(3/3)	Course code	F074
	Target students Division/major/grade	Software and Computer Engineering/Junior	Opening semester	2021 2ND SEMESTER
	Class time and classroom	Tue D(Pa1409)Thu C(Pa1409)	English Grade	A(100%English)
Reference to this course	Prerequisite courses	Discrete mathematics		
	Related basic courses	Algorithms		
	Recommended concurrent courses	AI		
	Related advanced courses			

Instructor	Name (title/division)		Da-Jung Cho(Assistant Professor, Software and Computer Engineering)		
	Office Room Number	Industrial-Academic Cooperation Center 509	Office phone Number	2635	e-mail
	Office hours		Homepage address		
Teaching Assistant	Name (title/division)				
	Office Room Number		Office phone Number		e-mail

### 1. Introduction

This course provides formal language and automata theory. We study the fundamental knowledge on computation and computability. In particular, we examine finite-state automata (regular languages), pushdown automata (context-free languages) and Turing machines (unrestricted languages).

### 2. Course Objectives

The goal of this course is to provide students with an understanding of basic concepts in the theory of computation, including models of computation such as Turing machines; theory of programming languages, including grammars, parsing, syntax and semantics.

At the end of this course students will:

- be able to construct finite state machines and the equivalent regular expressions.
- be able to prove the equivalence of languages described by finite state machines and regular expressions.
- be able to construct pushdown automata and the equivalent context free grammars.
- be able to prove the equivalence of languages described by pushdown automata and context free grammars.
- be able to construct Turing machines and Post machines.
- be able to prove the equivalence of languages described by Turing machines and Post machines

### 3. Class types and activities

Mostly lectures.

6 assignments (pop-quiz or homework) will be issued.

The goal of assignment is to give you practice in mastering the course material. Specifically, you should spend at least 100?120 minutes trying to solve each problem beforehand.

### 4. Teaching Method

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> lecture                          | <input type="checkbox"/> discussion and debate              |
| <input type="checkbox"/> team project(presentation and case studies) | <input type="checkbox"/> experiments(role-playing,etc)      |
| <input type="checkbox"/> designing and production                    | <input type="checkbox"/> on-site learning(on-site training) |
| <input type="checkbox"/> others                                      |   |

### 5. Support Systems in Use

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|--|---|---|
| <input checked="" type="checkbox"/> AjouBb               | <input type="checkbox"/> automatic recording system | <input type="checkbox"/> web-based assignment |
| <input type="checkbox"/> cyber lecture                   | <input type="checkbox"/> online content             |   |
| <input type="checkbox"/> class behavior analyzing system | <input type="checkbox"/> others                     |   |

### 6. Teaching Tools

- |  |   |   |
|--|---|---|
| <input type="checkbox"/> PBL(Problem Based Learning) | <input type="checkbox"/> CBL(Case Based Learning) | <input type="checkbox"/> TBL(Team Based Learning)           |
| <input type="checkbox"/> UR(Undergraduate Research)  | <input type="checkbox"/> FL(Flipped Learning)     | <input type="checkbox"/> DSAL(Data Science Active Learning) |
| <input type="checkbox"/> others                      |   |   |

### 7. Knowledge and ability required for taking this course

Knowledge about discrete mathematics (e.g., graphs, trees, logic, and proof techniques) is required for taking this course

## 8. Method of Evaluation

Evaluation Item	The Number of Times	Evaluation Proportion	Remarks
Attendance		5%	
midterm exam		35%	
final exam		40%	
quiz		10%	
presentation			
discussion			
homework		10%	
etc			
study hours			

## 9. Textbook and supplementary material

Main/Sub	Title (Web-site)	Writer	Publisher	Publication year
Main	Introduction to Automata Theory, Languages, and Computation, 3rd edition	Hopcroft, Motwani and Ullman	Pearson Addison Wesley	

## 10. Class system and Class shedule

<p>This course covers the following topics:</p> <ul style="list-style-type: none"> <li>-Introduction: Chapter 1</li> <li>-Finite-state automata: Chapter 2</li> <li>-Regular languages and expressions: Chapter 3</li> <li>-Regular language properties: Chapter 4</li> <li>-Context-free languages: Chapter 5</li> <li>-Pushdown automata: Chapter 6</li> <li>-Context-free language properties: Chapter 7</li> <li>-Turing machines: Chapter 8</li> </ul>
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### < Class Schedule >

\* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
1	Introduction	E	Da-Jung Cho			
2	Finite-State automata	E	Da-Jung Cho			
3	Regular expressions and languages	E	Da-Jung Cho			

< Class Schedule >

\* language : K-korean, E-English

Weeks	Topics	language	Instructor	Teaching Method	Evaluation Method	Matter to be prepared
4	Regular expressions and languages	E	Da-Jung Cho			
5	Regular expressions and languages	E	Da-Jung Cho			
6	Regular language properties	E	Da-Jung Cho			
7	Regular language properties	E	Da-Jung Cho			
8	Midterm exam	E	Da-Jung Cho			
9	Context-free languages	E	Da-Jung Cho			
10	Context-free languages	E	Da-Jung Cho			
11	Pushdown automata	E	Da-Jung Cho			
12	Context-free language properties	E	Da-Jung Cho			
13	Context-free language properties	E	Da-Jung Cho			
14	Turing machines	E	Da-Jung Cho			
15	Turing machines	E	Da-Jung Cho			
16	Final exam	E	Da-Jung Cho			

11. Other items of notification