

# CS470 – 인공지능개론

## Introduction to Artificial Intelligence

(Lectures in English)

Spring 2022

v1.0

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<b>Class hours:</b>	<b>Tue/Thu 10:30~12:00</b>
<b>Classroom:</b>	#1501, E3-1(CS Bldg.)
<b>Course web:</b>	<b>KLMS in the KAIST Portal</b>
<b>Teaching assistant:</b>	<b>Mr. Dongkun Lee</b> , Email: babba82200@naver.com
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<b>TA office hours:</b>	Anytime (by appointment)
<b>Prerequisites:</b>	Statistics, data structures, and substantial programming skills
<b>Textbooks:</b>	[RN21] Stuart Russell and Peter Norvig, <i>Artificial Intelligence: A Modern Approach (4th ed.)</i> , Pearson Education, 2021.
<b>Grading scale:</b>	Each student chooses either letter grading (usual A/B/C/D scale) or S/U grading.
<b>Grading criteria:</b>	<b>Homework/practice (35%)</b> - assessed individually <b>Group project (60%)</b> - assessed by group <b>Class participation (5%)</b> - assessed individually

### Course description:

This course aims to be a general introductory AI course, covering trends and techniques of AI, namely, intelligent agents, searching, constraint satisfaction, logical reasoning, planning, knowledge representation, uncertain reasoning, machine learning, natural language processing, computer vision, and intelligent robots, to provide a comprehensive spectrum of AI.

The course also aims to meet different levels of demands from diverse groups of audience by providing (1) recent trends of AI for beginners, (2) fundamental theories of AI for those wish to learn something, and (3) substantial practice for problem solving and applications. For this purpose, homeworks

and some laboratory works are included, and a group project will be imposed. Due to the unfortunate difficult situation raised from COVID-19, there will be no midterm and final exams.

### **Group project:**

Three or four students form a group and perform a project in collaboration. The group will choose one of the following two options.

**Project option 1:** Perform a mini-R&D project of problem-solving using AI techniques. A list of R&D topics will be given in due course.

**Project option 2:** Perform a project of replicating a recent AI paper (taken from the top conferences listed below), and making meaningful improvements.

- AI/ML – IJCAI, AAAI, NeurIPS, ICML, ICLR, etc.
- NLP – ACL, EMNLP, NAACL, etc.
- Data Mining – KDD, ICDM, CIKM, WSDM, etc.
- Computer Vision – CVPR, ICCV, ECCV, ICIP, etc.

### **Course schedule:**

Wk	Date	Topic	Textbook Chapters	Homework	Lab. / Project
1	3/1	No class (National Holiday)			
	3/3	Course introduction (via Zoom online meeting) -Course objectives, plans and logistics			
2	3/8	Introduction to AI (L01)	[RN21] Ch. 1		
	3/10	Intelligent agents (L02)	[RN21] Ch. 2		
3	3/15	Deep learning practice (I) (L03a)	[RN21] Ch. 21		Teaming
	3/17	-Introduction to neural networks			
4	3/22	Deep learning practice (II) (L03b)		HW1 (Lab1)	Lab1
	3/24	-Convolutional neural networks			
5	3/29	Deep learning practice (III) (L03c)		HW2 (Lab2)	Lab2
	3/31	-Recurrent neural networks			
6	4/5	Term project – topic presentations			Topics
	4/7	Searching (I) (L04) -Solving problems by searching -Search in complex environments	[RN21] Ch. 3, 4	HW3	
7	4/12	Searching (II) (L05) -Adversarial search and games	[RN21] Ch. 5		
	4/14	Term project – proposal			Proposal
8	4/18-22	Midterm exam period (no classes)			
9	4/26	Constraint satisfaction problems (L06) -Features and constraints	[RN21] Ch. 6	HW4	

	4/28	<b>Knowledge and reasoning (I) (L07)</b> -Propositional logic	[RN21] Ch. 7		
10	5/3	<b>Knowledge and reasoning (I) (L08)</b> -First-order logic	[RN21] Ch. 8		
	5/5	<b>No class (National Holiday)</b>			
11	5/10	<b>Knowledge and reasoning (II) (L09-L10)</b>	[RN21] Ch. 9, 10, 11	HW5	
	5/12	-Inference in first-order logic -Knowledge representation -Automated planning			
12	5/17	<b>Language and communication (L11)</b>	[RN21] Ch. 23, 24		
	5/19	-Natural language processing -Neural NLP			
13	5/24	<b>Term project – progress</b>			<b>Progress</b>
	5/26	<b>Explainability of AI (L12)</b>	Ch. 27		
14	5/31	<b>Uncertain knowledge and reasoning (L13)</b> -Quantifying uncertainty -Probabilistic reasoning -Making simple/complex decisions	[RN21] Ch. 12, 13, 16, 17		
	6/2	<b>Machine learning (I) (L14)</b> -Learning from examples	[RN21] Ch. 19	HW6	
15	6/7	<b>Machine learning (II) (L15)</b> -Learning probabilistic models -Reinforcement learning	[RN21] Ch. 20, 22		
	6/9	<b>Computer vision and robotics (L16)</b> -Computer vision -Robotics	[RN21] Ch. 25, 26		
16	6/13-17	<b>Final exam period (no classes)</b> <b>Term project – Final Presentation (video recording)</b> <b>(due: Friday June 17, 23:59)</b> <b>Term project – Final Paper (due: Friday June 17, 23:59)</b>			<b>Final Present'n / Final Paper</b>

\* This schedule is subject to change.

(Syllabus version 1.0 – 2022/01/02)