

# (Syllabus)

[1] (Basic Information)					
<u>(Course Information)</u>					
/	2023 / 2		(Campus)		(Seoul Campus)
(Year/Semester)					
(Course No.)	57542	(Class No.)	01	(Credit)	3
(Course Title)	(DEEP UNSUPERVISED LEARNING)	/		208 (208 ( 2 )) 213 <SW 1> 7,8,9(College of engineering2 208 (208 ( 2 )) 213 <SW 1> TUE7,8,9)	
(Course Classification)	(elective major course)	(Lecture Type)		(Lone-teaching course)	
(Course Type)	(Theoretical course)	(Medium of Instruction)			
(Accreditation)		(Accreditation of Engineering Education)			
(College)	(Graduate School)	( ) (Department)		AI (Department of Artificial Intelligence)	
e-class (Usage of e-class)	Yes				
<u>(Instructor Information)</u>					
(Name)	(Changhee Lee)	(Department)		AI (Department of Artificial Intelligence)	
(Office Phone No.)	02-820-5707	(Contact No.)		02-820-5707	
E-mail (E-mail)	changheele@cau.ac.kr	(Department Phone No.)		02-820-6357	
가 (Office Hour)	THU 4 - 5 pm	(Office Location)		208 509	
(Course Web-site)					

[2] / (Learning Objectives/Outcomes)		
<u>(Course Description)</u>		
This course will cover two areas of deep learning in which labeled data is not required: Deep Generative Models and Self-supervised Learning. Recent advances in generative models have made it possible to realistically model high-dimensional raw data such as natural images, audio waveforms, and text corpora. Strides in self-supervised learning have started to close the gap between supervised representation learning and unsupervised representation learning in terms of fine-tuning unseen tasks. This course will cover the theoretical foundations of these topics as well as their newly enabled applications.		
<u>(Prerequisites and Co-requisites)</u>		
Machine learning, deep learning		
<u>(Learning Objectives)</u>		
Cover a handful (about 5~6) of important algorithms in unsupervised learning including generative models, contrastive models, and self-supervised models in high detail.		
<u>(Learning Outcomes)</u>		
By the end of this course, you should have a good understanding of the following core techniques in the field of deep unsupervised learning: - generative models (including VAEs, GANs) - self-supervised learning models (including contrastive learning methods) - semi-supervised learning models (including PI-model, temporal ensemble, etc.) - and many others		
Students will also have chances to develop paper reading skills and Python programming skills via assignments, midterm, and final projects that require implementing some of the algorithms covered in this class based on real-world data.		
[3] (Course Methods)		
<u>(Teaching and Learning Methods)</u>		
(Teaching and Learning Methods)	가 (Additional Description)	
- (Lecture)	This course consists of a series of lectures that will introduce students to many of the topics to expand their mathematical background and problem-solving skills.	
/ - (Group)	The final project will include an in-person presentation and discussion (approximately 30 minutes) in class.	
- (Group)	For the final project, you will be asked to apply a set of XAI techniques covered in this course to deep neural networks on real-world datasets.	
- (Mid-term Exam)	The midterm will be either an exam about the mathematical backgrounds and techniques for deep unsupervised learning methods or a project writing a survey paper on a couple of methods covered in this course.	
<u>(Assignments)</u>		
(Assignments)	(No.)	( , , )(Assignments Description)
(Practice)	5	Approximately 3~5 assignments will be distributed to remind students of the contents, to enhance their problem-solving skills, and to implement XAI techniques. The exact number of assignments may vary.
<u>(Textbooks, Reading, and other Materials)</u>		

[4] 가 (Student Assessment)
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가 (Assessment Item)	가 (%) (Assessment Ratio)	가 (Additional Description)
(Attendance)	10	
(Mid-term Exam)	30	In-class examination
(Final Exam)	40	A group project on applying deep unsupervised learning techniques on real-world datasets. You will be asked to submit a 7-page (a full paper-like) report and in-class presentation and discussion.
(Assignment)	30	There will be about 5 assignments in total. The assignments will be from the materials covered in the class and may include Python implementations.

[5] (Course Schedule)

(Week)	(Instructor)	(Topic & Content)	(Student Assignment)	가 (Additional Description & Instructor Assignment)
1	Changhee Lee	Orientation & Introduction to Deep Unsupervised Learning	TBA	TBA
2	Changhee Lee	Preliminaries & Likelihood-based Models - Part 1	TBA	TBA
3	Changhee Lee	Likelihood-based Models - Part 2	TBA	TBA
4	Changhee Lee	Latent Variable Models - Part 1	TBA	TBA
5	Changhee Lee	Latent Variable Models - Part 2	TBA	TBA
6	Changhee Lee	Implicit Models (GANs) - Part 1	TBA	TBA
7	Changhee Lee	Implicit Models (GANs) - Part 2	TBA	TBA
8	Changhee Lee	Midterm	TBA	TBA
9	Changhee Lee	Self-Supervised Learning Models - Part 1		
10	Changhee Lee	Self-Supervised Learning Models - Part 2	TBA	TBA
11	Changhee Lee	Self-Supervised Learning Models - Part 3	TBA	TBA
12	Changhee Lee	Semi-Supervised Learning Models - Part 1	TBA	TBA
13	Changhee Lee	Semi-Supervised Learning Models - Part 2	TBA	TBA
14	Changhee Lee	Other Models	TBA	TBA
15	Changhee Lee	Final Projects Showcase	Final Project Reports	
16	Changhee Lee	Final Projects Showcase	Final Project Reports	

[6] (Guide to Learning)

The schedule can be changed. The exact dates of examinations will be announced during the class and posted in e-Class

(Previous Exam Samples)

< 가 >(<Download Additional Sample>)

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( In pursuant to the Article 71 "Discipline "of the Chung-Ang University Regulations, and Article 47 "Punishment for Cheating during Examination "under Chapter 6 of the Academic Affairs Management Rules, any student caught engaging in academic misconduct during an exam will be subject to disciplinary action.)

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2. : , 가
3. / : 가 , 가
4. : 02-820-6577~9( ), 031-670-4816( )  
( cauable)

In this class, students with disabilities are eligible for reasonable accommodations depending on the type and severity of disability. If you wish to receive accommodations listed below, please contact the Support Center for Students with Disabilities.

1. Visual Impairment: Braille, large print, electronic class materials, volunteer note-taker, adjustments in assessment practices, etc.
2. Hearing Impairment: Volunteer note-taker, stenographer, adjustments in assessment practices, etc.
3. Physical Disabilities/Brain Lesions: Classrooms with wheelchair access, volunteer note-taker, adjustments in assessment practices, etc.
4. Accommodations for students with other psychiatric disabilities or health impairments can be arranged through the Support Center for Students with Disabilities after consultation.  
Inquiry: 02-820-6577~9 (Seoul Campus), 031-670-4816 (Anseong Campus)  
- KakaoTalk Plus Friend ID: @cauable