



# 2024학년도 1학기 강의계획안 (Syllabus)

교과목명 Course Title	Carbon Capture, Utilization and Storage (이산화탄소 포집, 활용 및 저장)	학수번호 -분반 Course No.	38535-01
개설전공 Department/Major	Climate and Energy Systems Engineering (기후·에너지시스템공학전공)	학점/시간 Credit/Hours	3.0 / 3.0
수업시간/강의실 Class Time/ Classroom	Monday 2 (09:30-10:45) / Research Cooperation Building B109 (연구협력관 B109) Thursday 3 (11:00-12:15) / New Engineering Building 152 (신공학관 152)		
담당교원 Instructor	Name : Baehyun Min (민 배 현)	Department: Climate & Energy Systems Eng. (기후·에너지시스템공학전공)	
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면담시간/장소 Office Hours/ Office Location	Hours: Please make an appointment via email or cyber campus Location: Research Cooperation Building Office #404 (연구협력관 404호)		

## I. 교과목 정보 Course Overview

### 1. 교과목 개요 Course Description

The course deals with basic engineering knowledge on carbon capture, utilization, and storage (CCUS) that actively copes with and mitigate global warming and climate change. Note that more focuses are put on theory and simulation exercises for CO<sub>2</sub> storage. Note that practice lectures are pre-recorded video lectures.)

(기후변화에 대응 및 적응하는 온실가스 감축 기술인 이산화탄소 포집, 활용 및 저장 기술에 대한 공학적 기초지식을 습득한다. 이산화탄소 지중저장에 관한 이론 및 시뮬레이션 실습에 중점을 둔다. 본 수업의 실습 강의들은 사전녹화 비디오 강의로 진행한다.)

### 2. 선수학습사항 Prerequisites

It is recommended to take the course “Carbon Energy (탄소에너지),” which was previously “Introduction to Energy Resources (자원공학개론),” as a prerequisite, but not mandatory.

### 3. 강의방식 Course Format

As a blended course, note that all exercise lectures are pre-recorded video lecture.

(본 교과목은 융합수업을 채택함에 따라, 모든 실습 강의는 사전 녹화 강의로 진행됩니다).

강의 Lecture	발표/토론 Discussion/Presentation	실험/실습 Experiment/Practicum	현장실습 Field Study	기타 Other
70%	7%	23%	-	-

(위 항목은 실제 강의방식에 맞추어 변경 가능합니다.)

강의 진행 방식 설명 (explanation of course format): Powerpoint, Writing on the Whiteboard, & Simulation Exercises

### 4. 교과목표 Course Objectives

The course aims at encouraging students to learn the following fundamentals in CCS:

- Global Warming, Climate Change Mitigation and Adaptation (지구온난화현상과 기후변화대응 및 적응)



- CO<sub>2</sub> Storage (CO<sub>2</sub> 지중저장 기술)
- Simulation Exercises for CO<sub>2</sub> Storage (CO<sub>2</sub> 지중저장 시뮬레이션)
- CO<sub>2</sub> Capture Technology (CO<sub>2</sub> 포집 기술)
- CO<sub>2</sub> Conversion Technology (CO<sub>2</sub> 전환 기술)
- CCS Economics (CCS 경제성)
- Group Project Presentation & Report (Any subject related to CCUS is welcome.)

### 5. 학습평가 방식 Evaluation System

Relative evaluation     Absolute evaluation     Others : \_\_\_\_\_

- Explanation of evaluation system:

(아래 항목은 실제 학습평가방식에 맞추어 변경 가능합니다.)

- 상대평가 (Relative Evaluation)
- 지각 1회 = 결석 0.5회. 지각 여부는 수업 시작시간을 기준으로 함.
- 결석 3회 이하는 최종 성적에 영향 없음
- 결석 3회 초과부터는 결석 1회당 최종 성적에서 2점씩 감점 (지각은 1회당 0.5점 감점)
- 결석 10회 초과는 F 학점 부여

“Relative Evaluation” is the evaluation system of this course. You are encouraged to attend all class sessions. If you have any situation which prevents you from attending class (e.g., illness, family or personal issues, etc.), please let me know your absence via email or message at the Cyber Campus before class in advance. Three or fewer absences do not affect your grade. If you miss four days or more, however, every absence from the fourth absence deducts two points from your final score. Two late arrivals are equal to one absence. More than ten absences will force you to be given F grade by the university regulation.

중간고사 Midterm Exam	기말고사 Final Exam	퀴즈 Quizzes	발표 Presentation	리포트 Report	과제물 Assignments	참여도 Participation	기타 Others
30%	30%	%	20%	%	20%	%	%

\* Evaluation of group projects may include peer evaluations.

## II. Course Materials and Additional Readings

### 1. 주교재 Required Materials

Lecture Notes

CCS 교재 편찬위원회, 2013. 이산화탄소 포집, 저장 및 전환기술 (2판). 청문각.

### 2. 부교재 Supplementary Materials

강주명, 2008. 석유공학개론-개정판, 서울대학교 출판부.

Computer Modelling Group (CMG), 2018. GEM Tutorial. CMG.

### 3. 참고문헌 Optional Additional Readings

## III. 수업운영규정 Course Policies

\* For laboratory courses, all students are required to complete lab safety training.



#### IV. 주차별 강의계획 Course Schedule

Week	Date	Topics & Class Materials, Assignments (주요강의내용 및 자료, 과제)
1주차	2.29 (Thu)	0. Course Introduction (Pre-recorded video lecture)
	3.4. (Mon)	1. CCUS Overview
2주차	3.7. (Thu)	1. CCUS Overview
	3.11. (Mon)	2. CO <sub>2</sub> Storage - Part 1. Basics
3주차	3.14. (Thu)	2. CO <sub>2</sub> Storage - Part 1. Basics
	3.18. (Mon)	RE Exercise 1. Introduction to Reservoir Simulation (Part 1) (Video lecture)
4주차	3.21. (Thu)	2. CO <sub>2</sub> Storage - Part 2. Site Selection
	3.25. (Mon)	RE Exercise 2. Introduction to Reservoir Simulation (Part 2) (Video lecture)
5주차	3.28. (Thu)	2. CO <sub>2</sub> Storage - Part 2. Site Selection
	4.1. (Mon)	CCS Exercise 1. Base Model with Structural Trapping (Video lecture)
6주차	4.4. (Thu)	2. CO <sub>2</sub> Storage - Part 3. Containment
	4.8. (Mon)	CCS Exercise 2. Hysteresis Trapping (Video lecture)
7주차	4.11. (Thu)	2. CO <sub>2</sub> Storage - Part 3. Containment
	4.15. (Mon)	** Midterm Examination **
8주차	4.18. (Thu)	2. CO <sub>2</sub> Storage - Part 4. Modeling
	4.22. (Mon)	CCS Exercise 3. Solubility Trapping (Video lecture)
9주차	4.25. (Thu)	2. CO <sub>2</sub> Storage - Part 4. Modeling
	4.29. (Mon)	CCS Exercise 4. Mineral Trapping (Video lecture)
10주차	5.2. (Thu)	2. CO <sub>2</sub> Storage - Part 5. Monitoring
	5.6. (Mon)	CCS Exercise 5. 3D GHG Model (Optional) (Video lecture)
11주차	5.9. (Thu)	3. CO <sub>2</sub> Capture - Part 1. Fuel
	5.13. (Mon)	3. CO <sub>2</sub> Capture - Part 2. Energy and Industrial Processes
12주차	5.16. (Thu)	3. CO <sub>2</sub> Capture - Part 3. Technology
	5.20. (Mon)	3. CO <sub>2</sub> Capture - Part 4. Transport
13주차	5.23. (Thu)	4. CCUS Economics
	5.27. (Mon)	4. CCUS Economics
14주차	5.30. (Thu)	Group Project Presentation
	6.3. (Mon)	Group Project Presentation
15주차	6.6. (Thu)	4. CCUS Economics (Video lecture due to National Holiday)
	6.10. (Mon)	** Final Examination **
보강1 (필요시) Makeup Classes	(요일, 장소)	TBD

#### V. 참고사항 Special Accommodations

\* 학칙 제57조에 의거하여 장애학생은 학기 첫 주에 교과목 담당교수와의 면담을 통해 출석, 강의, 과제 및 시험에 관한 교수학습지원 사항을 요청할 수 있으며 요청된 사항에 대해 담당교수 또는 장애학생지원센터를 통해 지원받을 수 있습니다.

According to the University regulation #57, students with disabilities can request special accommodation related to attendance, lectures, assignments, and/or tests by contacting the course professor at the beginning of semester. Based on the nature of the students' requests, students can receive support for such accommodations from the course professor and/or from the Support Center for Students with Disabilities (SCSD).

\* 강의계획안의 내용은 추후 변경될 수 있습니다.

\* The contents of this syllabus are not final—they may be updated.