City University of Hong Kong
Course Syllabus

offered by School of Energy and Environment
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	**Carbon Capture Use and Storage**
Course Code:	**SEE6125**
Course Duration:	**One semester**
Credit Units:	**3 credits**
Level:	**P6**
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**Nil**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

This course offers a comprehensive understanding of the role of Carbon Capture, Use, and Storage (CCUS) in mitigating climate change and facilitating energy transition. The curriculum provides an in-depth exploration of CCUS technologies, their integration into various energy and industrial sectors for decarbonization, and the requisite policy and regulatory frameworks for their implementation. Students will gain a thorough understanding of the technological aspects of CCUS, including its potential benefits, risks, and challenges towards large-scale deployment. The course underscores the critical importance of CCUS in achieving global climate goals, particularly in maintaining the global carbon budget to limit global warming to 1.5 and 2 ºC.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	*A2*	*A3*
1.	Articulate CCUS in decarbonization across various energy and industrial sectors, and its crucial role in meeting global climate goals.	20%	√		
2.	Delineate the key concepts, principles, advantages, and limitations of each technological aspect of CCUS.	40%		√	
3.	Apply the principles and concepts of CCUS technologies in devising solutions to mitigate and eradicate carbon emissions in vital sectors.	40%		√	
		100%			

A1: Attitude
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: *Accomplishments*
Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.			Hours/week (if applicable)
		1	2	3	
Lectures	Explain key concepts and principles of CCUS technologies	✓	✓	✓	
Tutorials	Solidify students' understanding of key concepts and principles via practice and tackling confusions or difficulties encountered in the lectures and exercises	✓	✓	✓	

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.			Weighting	Remarks
	1	2	3		
Continuous Assessment: 50%					
<u>Assignments</u> Several assignments will be given throughout the semester. Through the assignments, students will demonstrate their understanding of the underlying concepts and principles of CCUS technologies.	✓	✓	✓	30%	
<u>Test</u> Students will complete a mid-term test to demonstrate their ability to apply their knowledge to analyze and solve problems related to CCUS technologies.	✓	✓	✓	20%	
Examination: 50% (duration: 2 hours, if applicable)					
				100%	

To pass a course, a student must do ALL of the following:

1) obtain at least 30% of the total marks allocated towards coursework (combination of assignments, pop quizzes, term paper, lab reports and/ or quiz, if applicable);
2) obtain at least 30% of the total marks allocated towards final examination (if applicable); and
3) meet the criteria listed in the section on Assessment Rubrics.

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Assignments	Ability to explain concepts, analyze and solve problems related to CCUS technologies	Excellent understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Good understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Fair understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Marginally acceptable understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Poor understanding of concepts and ability to analyze and solve problems related to CCUS technologies
2. Test	Ability to explain concepts, analyze and solve problems related to CCUS technologies	Excellent understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Good understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Fair understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Marginally acceptable understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Poor understanding of concepts and ability to analyze and solve problems related to CCUS technologies
3. Examination	Ability to explain concepts, analyze and solve problems related to CCUS technologies	Excellent understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Good understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Fair understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Marginally acceptable understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Poor understanding of concepts and ability to analyze and solve problems related to CCUS technologies
…						

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Assignments	Ability to explain concepts, analyze and solve problems related to CCUS technologies	Excellent understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Good understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Marginally acceptable understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Poor understanding of concepts and ability to analyze and solve problems related to CCUS technologies
2. Test	Ability to explain concepts, analyze and solve problems related to CCUS technologies	Excellent understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Good understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Marginally acceptable understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Poor understanding of concepts and ability to analyze and solve problems related to CCUS technologies
3. Examination	Ability to explain concepts, analyze and solve problems related to CCUS technologies	Excellent understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Good understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Marginally acceptable understanding of concepts and ability to analyze and solve problems related to CCUS technologies	Poor understanding of concepts and ability to analyze and solve problems related to CCUS technologies

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

Carbon capture, gas separation, absorption and stripping, adsorption, membrane, geological storage, carbon dioxide utilization, carbon budget, carbon neutrality, negative emissions, carbon removal, climate changes, climate goals.

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

Nil

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

1.	Smit,B., Reimer, J.A., Oldenburg, C.M., Bourg, I.C. (2014) Introduction to Carbon Capture and Sequestration. Imperial College Press.
2.	Intergovernmental Panel on Climate Change (IPCC), Climate Change 2022: Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, 2022: https://www.ipcc.ch/report/ar6/wg3/.
3.	International Energy Agency (IEA), "CO_2 Capture and Utilisation": https://www.iea.org/energy-system/carbon-capture-utilisation-and-storage/co2-capture-and-utilisation#overview