

MODULE DESCRIPTOR

Module Title

Advanced Carbon Capture, Utilisation And Storage

Reference	EN5200	Version	1
Created	September 2023	SCQF Level	SCQF 11
Approved	February 2024	SCQF Points	15
Amended		ECTS Points	7.5

Aims of Module

To develop knowledge of concepts and principles applicable to carbon capture, utilisation and storage (CCUS), and an awareness of its roles in energy transition and mitigation of greenhouse gas (GHG) emissions.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Synthesise knowledge of the principles and technologies involved in carbon capture, utilisation and storage (CCUS).
- 2 Synthesise the main scientific and engineering principles and concepts of fluid flow, geomechanics and geochemistry and their application to CCUS project development.
- 3 Evaluate the CO₂ removal/storage process to quantify CO₂ removal.
- 4 Appraise the economics and environmental aspects of CCUS project.

Indicative Module Content

The module content includes major carbon-intensive industries, CO₂ capture methods and technologies, CO₂ transport via pipelines, CO₂ storage in depleted oil reservoirs and saline aquifers, CO₂ utilisation for industrial processes and manufacturing, CO₂ enhanced oil recovery, CO₂ fluid properties and phase envelope, estimation of CO₂ and other GHG removal, monitoring and verification of stored CO₂, formation rock-CO₂ interaction and associated geochemical reactions, geomechanics of CO₂ injection and storage, economics of CCUS project, environmental aspects of CCUS.

Module Delivery

The module is taught through lectures and tutorial, supported by guided self-study.

Indicative Student Workload

	Full Time	Part Time
Contact Hours	35	35
Non-Contact Hours	115	115
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	150
<i>Actual Placement hours for professional, statutory or regulatory body</i>		

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

Type: Coursework Weighting: 100% Outcomes Assessed: 1, 2, 3, 4

Description: The coursework consists of a written technical report on aspects of carbon capture, transport, sequestration, and utilisation and data or design-driven evaluation of technical, environmental and/or economic aspects of CCUS.

MODULE PERFORMANCE DESCRIPTOR**Explanatory Text**

Component 1 comprises of 100% of the module grade. To pass the module, a D grade is required.

Module Grade	Minimum Requirements to achieve Module Grade:
A	A
B	B
C	C
D	D
E	E
F	F
NS	Non-submission of work by published deadline or non-attendance for examination

Module Requirements

Prerequisites for Module	EN4202
Corequisites for module	None.
Precluded Modules	None.

INDICATIVE BIBLIOGRAPHY

- 1 Bandyopadhyay, A. 2021 Carbon Capture and Storage - CO2 Management Technologies 1st Edition (Ed.); Academic Press; ISBN 9781774633410.
- 2 Kuckshinrichs, W. & Hake, J. 2015 Carbon Capture, Storage and Use - Technical, Economic, Environmental and Societal Perspectives (Ed); Springer; ISBN 978-3-319-11943-4 (eBook).
- 3 Royal Society of Chemistry, 2016. Carbon Capture and Storage (Faraday Discussions): Faraday Discussion 192: Volume 192; ISBN: 9781782624783.
- 4 Rackley, S. A. 2017. Carbon Capture and Storage; Butterworth-Heinemann, eBook ISBN: 9780128120422
- 5 Wilcox, J. 2014. Carbon Capture; Springer; ISBN-10: 1493901257.