

## MODULE DESCRIPTOR

### Module Title

Carbon Capture, Utilisation and Storage

Reference	ENM507	Version	1
Created	June 2023	SCQF Level	SCQF 11
Approved	September 2023	SCQF Points	15
Amended		ECTS Points	7.5

### Aims of Module

The Carbon Capture Utilisation and Storage (CCUS) Short Course provides participants with a comprehensive understanding of the principles, technologies, and applications of CCUS in mitigating greenhouse gas (GHG) emissions and addressing climate change. Participants will develop knowledge of concepts and principles applicable to carbon capture, transport, sequestration and, utilisation in industrial processes and awareness of the roles of carbon capture utilisation and storage (CCUS) in energy transition and mitigation of GHG emission. This course aims to equip professionals, researchers, and policymakers with the knowledge and skills necessary to effectively engage in CCUS projects and initiatives.

### Learning Outcomes for Module

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

- 1 Develop knowledge and understanding of the principles and technologies of CCUS.
- 2 Critically appraise the opportunities and challenges associated with CCUS implementation taking into consideration economic, environmental, and regulatory factors.
- 3 Appraise the role of policy frameworks and incentives in promoting CCUS deployment.
- 4 Apply knowledge and understanding of the main scientific and engineering principles and concepts of fluid flow, geomechanics and geochemistry to CCUS project development.
- 5 Evaluate the CO<sub>2</sub> removal/storage process to quantify amount of CO<sub>2</sub> removal.

### Indicative Module Content

Major carbon-intensive industries, CO<sub>2</sub> capture methods and technologies, CO<sub>2</sub> transport via pipelines, CO<sub>2</sub> storage in depleted oil reservoirs and saline aquifers, CO<sub>2</sub> utilisation for industrial processes and manufacturing, CO<sub>2</sub> enhanced oil recovery, CO<sub>2</sub> fluid properties and phase envelope, Estimation of CO<sub>2</sub> and other GHG removal, monitoring and verification of stored CO<sub>2</sub>, formation rock- CO<sub>2</sub> interaction and associated geochemical reactions, geomechanics of CO<sub>2</sub> injection and storage, economics of CCUS project, environmental aspects of CCUS; Policy and Regulatory Frameworks for CCUS Implementation and GHG accounting; Public Communication; Health and Safety; Case Studies: CCUS Projects and Lessons Learned; Integration of CCUS in the Energy Transition.

**Module Delivery**

Blended Delivery - Lectures and 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

*Actual Placement hours for professional, statutory or regulatory body***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, 5

Description:

Individual written report.

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

Component 1 comprises 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

None but a background in engineering will be beneficial.

Corequisites for module

None.

Precluded Modules

None.

## INDICATIVE BIBLIOGRAPHY

- |   |  |
|---|--|
| 1 | TWIDELL, J. and WEIR, T., 2015. Renewable energy resources. Routledge.   |
| 2 | BUI, M. and DOWELL, N.M., Carbon Capture and Storage (2020 Edition). Royal Society of Chemistry (RSC).                                 |
| 3 | RACKLEY, S.A., 2017. Carbon Capture and Storage (Second Edition). Boston: Butterworth-Heinemann  |
| 4 | Bandyopadhyay, A. 2021 Carbon Capture and Storage - CO2 Management Technologies 1st Edition (Ed.); Academic Press; ISBN 9781774633410. |
| 5 | Wilcox, J. 2014. Carbon Capture; Springer; ISBN-10: 1493901257.  |