Module Code	CEU22E07
Module Name	Engineering and the Environment
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Assoc Prof. Sarah McCormack (mccorms1@tcd.ie) Prof. Laurence Gill (gilll@tcd.ie) Asst Prof. Liwen Xiao (liwen.xiao@tcd.ie)
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	On successful completion of this module, students should be able to: LO1.Have a knowledge of the fundamental causes of environmental impact including a basic familiarity with the methods of analysis. LO2.Have acquired knowledge of the major measures of environmental and energy sustainability. LO3.Have developed skills in the areas of environmental analysis, scientific reasoning and communication. LO4.Have developed practical experimental skills in environmental and energy measurement. LO5.Appraise claims of emerging technologies in terms of sustainability and contribution to supply. LO6.Gain an ability to undertake problem identification and to apply knowledge and understanding of basic science and engineering principals. LO7.Gain an ability to communicate effectively, not only with engineers but other professionals. **Graduate Attributes: levels of attainment** To act responsibly - Introduced To think independently - Introduced To develop continuously - Enhanced To communicate effectively - Enhanced

[1] TEP Glossary

Module Content

Introduction

- Population growth and environmental interaction; urbanisation; correlation of energy and economic growth; energy and environmental impact
- Introduction to concepts of sustainability, pollution and contamination
- Introduction to UN SDGs with focus on Energy and Water

Water and Wate Treatment

- Water treatment
- Wastewater treatment
- Solid waste treatment – recycling
- Energy from waste

Hydrology

- Hydrological cycle
- Rivers – hydrology
- Groundwater – hydrogeology
- Catchment contaminant pressures
- River organic pollution
- River nutrient pollution
- Wetlands – ecohydrology

Energy demand & Supply

- Energy and environmental impact: greenhouse gases, carbon cycle, climate change
- Energy demand – how much do we use? Sectoral usage, electricity, heating
- Energy supply - low-carbon generation: wind, wave, tidal, photovoltaic, biofuels, nuclear, solar, geothermal, storage
- How much energy use is sustainable?

Teaching and Learning Methods

The module is taught using a combination of lectures, guest lectures laboratories, tutorials and workshops. Students work individually and in groups thereby encouraging teamwork and cooperation.

Associated laboratory/project/tutorial programme

- Individual Project: Energy & Water consumption
- Laboratory: Measurement of dispersion in a fluid
- 2 Class tests
- Groupwork – Video/ Presentation

Assessment Details[2]
Please include the following:

Assessment Component	Assessment Description	LO Addressed	% of total	Week due

[2] TEP Guidelines on Workload and Assessment

• **Assessment Component** • **Assessment description** • **Learning Outcome(s) addressed** • **% of total** • **Assessment due date**	Laboratory	Dispersion laboratory	LO4, LO6	20 %	1 week after the lab session
	Energy & Water Demand	Individual report on energy and water usage	LO2, LO3, LO4, LO6	20 %	4
	Class tests	Biological and chemical concepts	LO4, LO6	40%	8 & 10
	Video/ Presentation	Group work	LO1 to LO7	20%	11 or 12

Reassessment Requirements	A new individual assignment will be set for reassessment
Contact Hours and Indicative Student Workload[2]	**Contact hours: 47 hrs (33hrs lectures, 3 hr lab, 11hrs tutorials)** **Independent Study (preparation for course and review of materials): 40 hrs** **Independent Study (preparation for assessment, incl. completion of assessment): 40 hrs**
Recommended Reading List	Recommended reading Environmental Engineering: Fundamentals, Sustainability, Design, JR Mihelcic, JB Zimmerman, 2010, Wiley [ISBN: 978-0470165058] Heat - How to Stop the Planet From Burning, George Monbiot, South End Press, 2009 [ISBN: 978-0896087873]
Module Pre-requisite	None
Module Co-requisite	None
Module Website	https://www.tcd.ie/Engineering/undergraduate/baiyear2/modules/2E7.pdf
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	No
Module Approval Date	
Approved by	

Academic Start Year	September 2025
Academic Year of Date	2025/2026