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| **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)<br>Prof. Laurence Gill (gilll@tcd.ie)<br>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:<br><br>LO1.Have a knowledge of the fundamental causes of environmental impact including a basic familiarity with the methods of analysis.<br>LO2.Have acquired knowledge of the major measures of environmental and energy sustainability.<br>LO3.Have developed skills in the areas of environmental analysis, scientific reasoning and communication.<br>LO4.Have developed practical experimental skills in environmental and energy measurement.<br>LO5.Appraise claims of emerging technologies in terms of sustainability and contribution to supply.<br>LO6.Gain an ability to undertake problem identification and to apply knowledge and understanding of basic science and engineering principals.<br>LO7.Gain an ability to communicate effectively, not only with engineers but other professionals.<br><br>**Graduate Attributes: levels of attainment**<br>To act responsibly - Introduced<br>To think independently - Introduced<br>To develop continuously - Enhanced<br>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 |
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[2] TEP Guidelines on Workload and Assessment

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| • **Assessment Component**<br>• **Assessment description**<br>• **Learning Outcome(s) addressed**<br>• **% of total**<br>• **Assessment due date** | Laboratory | Dispersion laboratory | LO4, LO6 | 20 % | 1 week after the lab session |
| | Class tests | Energy,<br>Biological<br>Chemical concepts | LO2, LO3,<br>LO4, LO5<br>LO6 | 60% | 4,<br>8<br>11 |
| | Video/ Presentation | Group work | LO1 to LO7 | 20% | 7 |

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| **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)**<br>**Independent Study (preparation for course and review of materials): 40 hrs**<br>**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]<br><br>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** | |

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| **Academic Start Year** | September 2025 |
| **Academic Year of Date** | 2024/2025 |