Module Code	CE7E03
Module Name	E3: Air Pollution
ECTS Weighting[1]	5 ECTS
Semester taught	Semester 1
Module Coordinator/s	Asst. Prof. John Gallagher [j.gallagher@tcd.ie] Lecturer(s): Asst Prof. John Gallagher [j.gallagher@tcd.ie] Prof. Aonghus McNabola [mcnabola@tcd.ie] Adj Asst Prof. Saniul Alam [alamms@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. Describe key concepts relating to air pollution science and its application to environmental engineering. LO2. Assess, apply and evaluate differing forms of air pollution models for the prediction of concentrations in the atmosphere. LO3. Appraise differing approaches to the control of air pollution for indoor and outdoor settings and in urban and industrial settings. LO4. Discuss the development and application of national emissions inventories and projections. LO5. Measure air pollution concentrations in practice to identify the advantages and limitations of differing monitoring approaches. L06. Critically assess an environmental impact assessment of new infrastructure developments from an air pollution perspective. **Graduate Attributes: levels of attainment** To act responsibly - Enhanced To think independently - Attained To develop continuously - Attained To communicate effectively – Enhanced

Module Content	The module commences with an introduction to the field of air pollution science, identifying the current challenges in the field and key background knowledge in the provision of clean air for society and the environment.
	The module explores the use of air pollution modelling to predict concentrations in various settings and to assess the impacts of policy changes, new technology or developments. The module also explores the control of air pollution in outdoor and indoor conditions from an environmental engineering perspective with a particular focus on sustainable approaches.
	We examine the development of national emissions inventories and the projection of pollution into the future using forecasting techniques. We appraise the physical measurement of air pollutants using field equipment.
	The module deals with the development of environmental impact assessment in relation to air pollution in infrastructure developments, using several case studies (e.g. incineration, construction projects, roads, etc).
Teaching and Learning Methods	All lectures will be delivered live from a lecture theatre (face-to-face) format on Tuesday afternoons (2-5pm) during the first semester, with remote access via Blackboard Collaborate and all sessions will be recorded. As such this blended course will apply flipped classroom components for face-to-face students and groups online, combining traditional lecture formats for student tasks and promoting peer-learning. Discussion boards will be provided for virtual students who have limited interaction with the class in the lecture theatre, to allow for questions related to topic areas covered and coursework.
	Two field practicals (live and recorded sessions, simultaneously available face-to-face and virtually) will provide hands-on experience of air quality science to ground fundamentals and context for some coursework and lecture material.
	Coursework provides opportunity to demonstrate independent learning through developing new skills (reviewing literature) and using new tools (air quality modelling software). Feedback provides further opportunity to learn.

Assessment Details[2]
Please include the following:
- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Personal Exposure	Personal exposure monitoring and modelling study (20-page limit).	LO1, LO2, LO5	50%	Wk6

• **% of total** • **Assessment due date**	Critical Review	Literature review in one of several specified topic areas (10-page limit). **OR** Work-based assessment report of air pollution mitigation initiative, considering application of monitoring, modelling and control (10-page limit).	LO1, LO3, LO4, LO6	25%	Wk9
	Regional Air Pollution	Background and regional air quality assessment (10-page limit).	LO2, LO4	25%	Wk12

Reassessment Requirements	Resubmission of failed coursework components.
Contact Hours and Indicative Student Workload[2]	**Contact hours:** 30 hours Lectures – 3 hours per week Tutorials – 3 hours **Independent Study (preparation for course and review of materials):** 10 hours Review of lecture notes, suggested reading and scientific papers provided for revision during the semester. **Independent Study (preparation for assessment, incl. completion of assessment):** 85 (coursework) Data collection and analysis using air pollution monitoring equipment. Review of scientific literature to develop a literature review on specific topic. Application of monitoring, modelling and control application of air pollution modelling tools.
Recommended Reading List	Environmental Engineering, G. Kiely (Chapter 8) Air Pollution: from a local to a global perspective. Fenger & Tjell Air Pollution Control Engineering. De Nevers. 2nd Ed. An Introduction to Air Pollution. Vallero. 4th Ed.
Module Pre-requisite	

Module Co-requisite	
Module Website	
Are other Schools/Departments involved in the delivery of this module? If yes, please provide details.	
Module Approval Date	
Approved by	
Academic Start Year	2021
Academic Year of Date	2021/2022