Module Code	EEU33C14
Module Name	Engineering Electromagnetics
ECTS credit weighting	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Declan O'Loughlin
Module Learning Outcomes with embedded Graduate Attributes	On successful completion of this module, students should be able to: LO1. Explain the fundamental principles of classical electromagnetics and implications for engineering across the frequency spectrum. LO2. State and manipulate Maxwell's equations in integral and differential forms in standard coordinate systems and units. LO3. Analyse and solve wave propagation problems in homogeneous media and at media boundaries. LO4. Model and describe introductory propagation problems such as transmission lines, wave guides and simple antennas. L05. Understand standards relating to electromagnetic compatibility, safety limits and beneficial and harmful bioelectromagnetic interactions.
Module Content	This module introduces students to electromagnetics and applications including the core theory and common design applications. Electromagnetics is used to design the core of most modern electronic systems from communications to modern medical treatments. In this module students will be introduced to the fundamentals of antennas and antennas design which is key to wireless communications from WIFI to mobile broadband, wave propagation in media and scattering which underpins many medical imaging modalities including x-rays and magnetic resonance imaging, and propagation problems such as waveguides and transmission lines which are used to design electricity transmission and distribution networks. Indicative learning topics are: 1. Maxwell's Equations 2. Propagation in lossless media 3. Propagation in lossy media. 4. Waves at Boundaries 5. Introduction to Transmission Lines 6. Introduction to antennas 7. Electromagnetic compatibility and safety
Teaching and Learning Methods	This module will be taught via lectures and tutorials with supporting laboratories.

Assessment Details[1]
Please include the following:

- **Assessment Component**
- **Assessment description**
- **Learning Outcome(s) addressed**
- **% of total**
- **Assessment due date**

Assessment Component	Assessment Description	LO Addressed	% of total	Week due
Written Examination	In-person examination	LO1-5	80	Examination Period
Continuous Assessment	Lab. report	LO3-4	20	During the semester

Reassessment Requirements

Reassessment Examination.

Contact Hours and Indicative Student Workload[2]

Contact hours: 40 including lectures, tutorials and laboratories.
Independent Study (preparation for course and review of materials): 60 hours
Independent Study (preparation for assessment, incl. completion of assessment): 25 hours

Recommended Reading List

Electromagnetic Fields for Engineers, Daniel S. Elliot.
Electromagnetic Wave Theory, Jin Au Kong.
Introduction to Electrodynamics, David J. Griffith.

Module Pre-requisite

Signals and Systems, Vector Calculus.

Module Co-requisite

Module Website

Are other Schools/Departments involved in the delivery of this module?

Module Approval Date

Approved by

Prof. Naomi Harte

Academic Start Year

September 2025

Academic Year of Date

2025/2026

[1] https://www.tcd.ie/CAPSL/resources/assessment
[2] TEP Guidelines on Workload and Assessment