Module Code	PYU11E04
Module Name	Physics
ECTS Weighting [1]	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Prof Stefan Hutzler
Module Learning Outcomes with reference to the Graduate Attributes and how they are developed in discipline	LO1. To introduce the student to the basic physical laws describing oscillations and waves (including light and sound), thermodynamic processes, heat and heat-transfer, electricity and magnetism LO2. To demonstrate the application of these laws and enable the student to apply them to basic, technologically relevant examples LO3. To introduce the student to measurement principles and their application to investigate physical phenomena LO4. To establish good laboratory practice and clearly written laboratory reports **Graduate Attributes: levels of attainment** To act responsibly - Introduced To think independently - Introduced To develop continuously - Introduced To communicate effectively - Introduced
Module Content	**Oscillations and Waves** • Simple harmonic oscillator (+resonance and damping), properties of waves, wave-equation, travelling and stationary waves, superposition-principle, Huygens principle, diffraction, interference, and polarisation, electromagnetic and sound waves. (Applications of electromagnetic waves in different frequency ranges). Sound waves, decibel scale.

1 TEP Glossary

	Geometrical Optics • Mirrors, lenses and prisms, reflection, refraction, polarisation, interference/diffraction, image formation, simple optical systems. **Thermal Physics** • Temperature (including kinetic gas theory), temperature scales, thermometers, thermal expansion, laws of thermodynamics, ideal and real gases, isochoric and isobaric heat capacity, thermodynamic cycles, Carnot cycle; heat transfer, conduction, convection, radiation. (Fridges, heat pumps, combustion engines) **Electricity and Magnetism** • Introduction to electrostatics, magnetostatics and electromagnetism: electric charge, Coulomb's law, electric currents, Ohm's law, concepts of electrical field and potential, energy, Biot-Savart Law, Ampere's Law, magnetic fields, Lorenz Force, electromagnetic induction and Faraday's Law, summary of Maxwell equations.
Teaching and Learning Methods	The module is taught using a combination of lectures, laboratories and tutorials. Most module materials (lecture notes, tutorials) are provided in electronic form. Students work in tutorial and laboratory groups, thereby encouraging teamwork and cooperation. Laboratory reports are individual.

Assessment Details [2]

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
End of semester exam	exam	1,2	60%	End of semester
Laboratory experiments and write-ups	Marking of write-ups	3,4	40%	Every other week
tutorials	unmarked	2	0	Every week

Reassessment Requirements

Exam only

Contact Hours and Indicative Student Workload Error! Bookmark not defined.

Contact hours: about 50
Independent Study (preparation for course and review of materials):
Independent Study (preparation for assessment, incl. completion of assessment):

Recommended Reading List

University Physics, Young and Freedman, 12th edition

Module Pre-requisite

none

Module Co-requisite

none

Module Website

https://www.tcd.ie/Engineering/undergraduate/baiyear1/modules/1E4.pdf

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

2 TEP Guidelines on Workload and Assessment

please provide details.	
Module Approval Date	
Approved by	
Academic Start Year	September 2025
Academic Year of Date	2025/2026