

Module Code	PYU11E04
Module Name	Physics
ECTS Weighting 1	5 ECTS
Semester taught	Semester 2
Module Coordinator/s	Prof Stefan Hutzler
<u>Module Learning Outcomes</u> with reference to the <u>Graduate Attributes</u> and how they are developed in discipline	<p>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</p> <p>LO2. To demonstrate the application of these laws and enable the student to apply them to basic, technologically relevant examples</p> <p>LO3. To introduce the student to measurement principles and their application to investigate physical phenomena</p> <p>LO4. To establish good laboratory practice and clearly written laboratory reports</p> <p>Graduate Attributes: levels of attainment To act responsibly - Introduced To think independently - Introduced To develop continuously - Introduced To communicate effectively - Introduced</p>
Module Content	<p>Oscillations and Waves</p> <ul style="list-style-type: none"> • 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.

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 <small>2</small> Please include the following: <ul style="list-style-type: none"> • 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 <small>Error! bookmark not defined.</small>	<table border="1"> <tr> <td>Contact hours: 54</td> </tr> <tr> <td>Independent Study (preparation for course and review of materials):</td> </tr> <tr> <td>Independent Study (preparation for assessment, incl. completion of assessment):</td> </tr> </table>					Contact hours: 54	Independent Study (preparation for course and review of materials):	Independent Study (preparation for assessment, incl. completion of assessment):
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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,
please provide details.**

Module Approval Date

Approved by

Academic Start Year September 2022

Academic Year of Date 2022/2023