1. KentVision Code and title of the module

PHYS0025 – Waves and Vibrations

## Division and School/Department or partner institution which will be responsible for management of the module

Division of Natural Sciences (Physics and ASSA)

## The level of the module (Level 4, Level 5, Level 6 or Level 7)

Level 3

## The number of credits and the ECTS value which the module represents

15 Credits (7.5 ECTS)

## Which term(s) the module is to be taught in (or other teaching pattern)

Autumn

## Prerequisite and co-requisite modules and/or any module restrictions

None

## The course(s) of study to which the module contributes

Compulsory for the following courses:

BSc (Hons) Physics with a Foundation Year

Not available as an elective module

## The intended subject specific learning outcomes. On successfully completing the module students will be able to:

8.1 Demonstrate knowledge and understanding of physical laws and principles, and their application to diverse areas of physics (this will include laws of motion, electromagnetism, wave phenomena and the properties of matter), with modules covering the necessary mathematics.

8.2 Demonstrate an ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions.

8.3 Demonstrate an ability to solve problems in physics using appropriate mathematical tools.

8.4 Demonstrate an ability to use mathematical techniques and analysis to model physical behaviour.

8.5 Demonstrate an ability to present and interpret information graphically.

8.6 Demonstrate an ability to make use of appropriate texts, or other learning resources as part of managing their own learning.

## The intended generic learning outcomes. On successfully completing the module students will be able to:

9.1 Demonstrate an ability to formulate problems in precise terms and to identify key issues, and the confidence to try different approaches in order to make progress on challenging problems. Numeracy is subsumed within this area.

9.2 Demonstrate analytical skills, associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.

9.3 Demonstrate the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.

## A synopsis of the curriculum

The module will cover the following:

* Types of waves. Characteristics of a wave: frequency, period, amplitude, wavelength and velocity. Introduction to transverse and longitudinal waves and polarisation.
* Properties of Waves: Qualitative description of the properties of waves; motion, reflection, refraction (Snell's law), dispersion, diffraction, interference, standing waves.
* Sound Waves: Description of sound - loudness, noise, note, pitch, intensity, intensity level. Properties of sound - reflection, refraction, interference (interference pattern produced by two speakers), beats, and resonance in a vibrating wire, including overtones/harmonics. Qualitative treatment of Doppler Effect.
* Electromagnetic (em) Waves: Electromagnetic spectrum. Qualitative treatment of em waves from different parts of the spectrum. Refraction of light - critical angle and optical fibres. Polarisation of light, microwaves and radio waves. Interference. Young's double slit experiment. The Michelson interferometer. Transmission diffraction grating - orders of diffraction, application in spectroscopy.
* Simple Harmonic Motion (SHM): Displacement, velocity and acceleration of a body undergoing SHM Link between SHM and circular motion. Force acting on a body undergoing SHM. Qualitative description of systems displaying SHM. Detailed description of pendulum and mass on a spring. Energy in SHM. General expression for SHM.
* Damping and Forced Oscillations: Qualitative treatment of light, heavy and critical damping. Qualitative discussion of the concepts of natural frequency, resonance and the behaviour of vibratory systems driven by a periodic force.

## Reading list

## The University is committed to ensuring that core reading materials are in accessible electronic format in line with the Kent Inclusive Practices.

## The most up to date reading list for each module can be found on the university's [reading list pages](https://kent.rl.talis.com/index.html).

## Contact Hours

Private Study: 125

Contact Hours: 25

Total: 150

## Assessment methods

13.1 Main assessment methods

* Moodle Quiz 1 (1 hour) – 15%
* Moodle Quiz 2 (1 hour) – 15%
* Examination (2 hours) – 70%

13.2 Reassessment methods

* Like-for-like

## Map of module learning outcomes (sections 9 & 10) to learning and teaching methods (section 13) and methods of assessment (section 14)

**Module learning outcomes against learning and teaching methods:**

| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 9.1 | 9.2 | 9.3 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lecture | **x** | **x** | **x** | **x** | **x** | **x** |  |  |  |

**Module learning outcomes against assessment methods:**

| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 9.1 | 9.2 | 9.3 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Moodle Quizzes | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

## Inclusive module design

The Division recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

## Campus(es) or centre(s) where module will be delivered

Canterbury

## Internationalisation

Science is an international discipline with widely applicable international resonance. This module presents subject-specific knowledge generated, developed, and refined by scientists around the world. Mastery of the learning outcomes will equip students to apply the knowledge in a wide range of international contexts and these will be addressed in making the content relevant to current global issues. The Division of Natural Sciences is an international community of students and staff and group activities and teaching will provide a platform for internationally-focussed discussion.

**DIVISIONAL USE ONLY**

**Module record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

| Date approved | New/Major/minor revision | Start date of delivery of (revised) version | Section revised  (if applicable) | Impacts PLOs (Q6&7 cover sheet) |
| --- | --- | --- | --- | --- |
| 10 Jul 2019 | Minor | Sept 2019 | 13-14 | No |
| 9 Dec 2021 | Minor | Sept 2022 | 12 | No |