1. **Title of the module**

PHYS3210 (PH321) - Mechanics

1. **School or partner institution which will be responsible for management of the module**

Physical Sciences

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 4

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

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

Autumn

1. **Prerequisite and co-requisite modules**

Pre-requisites:

UK A Level Physics Examinations with a normal minimum attainment of a Grade C on the main Physics A Level. Any generally accepted equivalent of this content and attainment is regarded as an acceptable prerequisite.

Co-requisites:

PHYS3110 Mathematics I

PHYS3120 Mathematics II

PHYS3040 Introduction to Astronomy and Special Relativity

PHYS3220 Electricity and Light

PHYS3230 Thermodynamics and Matter

PHYS3700 Laboratory and Computing Skills for Physicists

1. **The programmes of study to which the module contributes**

BSc/BSc with Foundation Year/BSc with Year in Industry/MPhys/MPhys with Year Abroad Physics

BSc/BSc with Year in Industry/MPhys/MPhys with Year Abroad Physics with Astrophysics

BSc/BSc with Year in Industry/MPhys/MPhys with Year Abroad Astronomy, Space Science and Astrophysics

This is not available as a wild module.

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

Have:

8.1 Knowledge and understanding of physical laws and principles, and their application to diverse areas of physics. (A1)

8.2 An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions. (B1)

8.3 An ability to solve problems in physics using appropriate mathematical tools. (B2)

8.4 An ability to use mathematical techniques and analysis to model physical behaviour. (B4)

8.5 An ability to present and interpret information graphically. (C2)

8.6 An ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning. (C6)

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

Have a knowledge and understanding of:

9.1 Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems; 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. (D1)

9.2 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. (D4)

1. **A synopsis of the curriculum**

Measurement and motion; Dimensional analysis, Motion in one dimension: velocity, acceleration, motion with constant acceleration, Motion in a plane with constant acceleration, projectile motion, uniform circular motion, and Newton's laws of motion.

Work, Energy and Momentum; Work, kinetic energy, power, potential energy, relation between force and potential energy, conservation of energy, application to gravitation and simple pendulum, momentum, conservation of linear momentum, elastic and inelastic collisions.

Rotational Motion; Rotational motion: angular velocity, angular acceleration, rotation with constant angular acceleration, rotational kinetic energy, moment of inertia, calculation of moment of inertia of a rod, disc or plate, torque, angular momentum, relation between torque and angular momentum, conservation of angular momentum.

Concept of field; 1/r2 fields; Gravitational Field; Kepler's Laws, Newton's law of gravitation, Gravitational potential, the gravitational field of a spherical shell by integration.

Oscillations and Mechanical Waves; Vibrations of an elastic spring, simple harmonic motion, energy in SHM, simple pendulum, physical pendulum, damped and driven oscillations, resonance, mechanical waves, periodic waves, their mathematical representation using wave vectors and wave functions, derivation of a wave equation, transverse and longitudinal waves, elastic waves on a string, principle of superposition, interference and formation of standing waves, normal modes and harmonics, sound waves with examples of interference to form beats, and the Doppler Effect. Phase velocity and group velocity.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Core:

* Physics for Scientists and Engineers (6th Ed.); Tipler, P.A. & Mosca, G. (2008)

1. **Learning and teaching methods**

Total contact hours: 30

Private study hours: 120

Total study hours: 150

1. **Assessment methods**
   1. Main assessment methods

Assignment 1 (5 hours, 3.33%)

Assignment 2 (5 hours, 3.33%)

Assignment 3 (5 hours, 3.33%)

Assignment 4 (5 hours, 3.33%)

Assignment 5 (5 hours, 3.33%)

Assignment 6 (5 hours, 3.33%)

Examination (2 hours, 80%)

13.2 Reassessment methods

Like-for-like

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *8.4* | *8.5* | *8.6* | *9.1* | *9.2* |  |  |  |  |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Lectures | **X** | **X** | **X** | **X** | **X** |  |  |  |  |  |  |  |
| Workshops | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  |  |  |  |
| Self-studies | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |
| Coursework | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  |  |  |  |
| Final exam | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  |  |  |  |

1. **Inclusive module design**

The School 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

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

Physics is an international subject with physical laws discovered and techniques developed and refined by Physicists across the globe. Mastery of the subject-specific learning outcomes will equip students to apply the theories and techniques of this module in a wide range of international contexts. The module team is drawn from the School of Physical Sciences, which includes many members of staff with international experience of teaching and research collaboration. In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material. The support SPS provides to its students is also internationally attuned given our international student body.

**FACULTIES SUPPORT OFFICE USE ONLY**

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 10/07/2019 | Minor | September 2019 | 13 |  |
|  |  |  |  |  |