Confirmation that this version of the module specification has been approved by the School Learning and Teaching Committee:

11-3-15……………………………………….(date)

**MODULE SPECIFICATION**

1. Title of the module

*PH321 Mechanics*

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

*School of Physical Sciences*

1. Start date of the module

*New module, running from2015-16*

1. The number of students expected to take the module

*150*

1. Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal

*PH301*

1. The level of the module (e.g. Certificate [C], Intermediate [I], Honours [H] or Postgraduate [M])

*C*

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

*15 (7.5 ECTS)*

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

*Term 1*

1. Prerequisite and co-requisite modules

*Co-requisite PH300 Mathematics*

1. The programmes of study to which the module contributes

*Physics (BSc, BSc with Foundation Year, BSc with Year in Industry, MPhys, MPhys with Year Abroad)*

*Physics with Astrophysics (BSc, MPhys, MPhys with Year Abroad)*

*Astronomy, Space Science and Astrophysics (BSc, MPhys, MPhys with Year Abroad)*

*This is not available as a wild module*

1. The intended subject specific learning outcomes
   1. *Knowledge and understanding of laws and principles of mechanics, and their application to diverse areas of physics. (A1)*
   2. *An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions. (B1)*
   3. *An ability to solve problems involving mechanics using appropriate mathematical tools. (B2)*
   4. *An ability to use mathematical techniques and analysis to model behaviour involving mechanics. (B4)*
   5. *An ability to present and interpret information relating to mechanics graphically. (C2)*
   6. *An ability to make use of appropriate texts, research-based materials or other learning resources about mechanics as part of managing their own learning. (C6)*
2. The intended generic learning outcomes
   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)*
   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)*
3. 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.*

1. Indicative Reading List

*CORE:*

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

*BACKGROUND:*

*Dimensional Analysis; Gibbings JC London, Springer London (2011)*

1. Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended module learning outcomes

* *Contact hours: Lectures (24 hours); workshop sessions (8 hours)*
* *The number of independent learning hours, including assignments 118 hrs*
* *Total number of study hours 150 hrs*

Achievement of module learning outcomes:

* *Lectures (11.1-11.5)*
* *Workshop sessions (11.1-11.6, 12.1, 12.2)*
* *Assignments (11.1-11.6; 12.1, 12.2)*
* *Self-study (11.1-11.6, 12.1, 12.2)*

1. Assessment methods and how these relate to testing achievement of the intended module learning outcomes

* *Coursework 30% including class test and homework, involving problem solving.Final (written, unseen, length 2 hours) exam 70%*

*The above assessments test students’ knowledge and understanding of laws and principles (11.1, 11.2, 12.2) and application of techniques to model behaviour and solve problems (11.3, 11.4, 11.5, 12.1, 12.2). In preparing for the assessments, students will need to manage their own revision using reference materials. (11.6, 12.2)*

1. Implications for learning resources, including staff, library, IT and space

*None. Replaces existing equivalent module*

1. *The School recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University’s disability/dyslexia support service, and specialist support will be provided where needed.*
2. Campus(es) where module will be delivered:

*Canterbury*