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

……………11th March 2015……………………………………

**MODULE SPECIFICATION**

1. Title of the module

# *PH304 Astrophysics, Space Science and Cosmology*

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

*School of Physical Sciences.*

1. Start date of the module

*Existing module, next running from 2015-16*

1. The number of students expected to take the module

*120*

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 Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal

*None*

1. The level of the module (e.g. Certificate [C], Intermediate [I], Honours [H] or Postgraduate [M])  
   *I*.
2. The number of credits and the ECTS value which the module represents

*15 (ECTS 7.5).*

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

*Term 1.*

1. Prerequisite and co-requisite modules

*None*

1. The programmes of study to which the module contributes

*Physics (BSc, BSc with Foundation Year, 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

*11.1 Knowledge and understanding of physical laws and principles in Astrophysics (including Cosmology) and Space Science, and their application to diverse areas of physics. (A1)*

*11.2 An ability to identify relevant principles and laws when dealing with problems in Astrophysics (including Cosmology) and Space Science, and to make approximations necessary to obtain solutions. (B1)*

*11.3 An ability to solve problems in Astrophysics (including Cosmology) and Space Science using appropriate mathematical tools. (B2)*

*11.4 An ability to use mathematical techniques and analysis to model physical behaviour in Astrophysics (including Cosmology) and Space Science. (B4)*

*11.5 An ability to present and interpret information about Astrophysics (including Cosmology) and Space Science graphically. (C2)*

*11.6 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

*12.1 Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems. Numeracy is subsumed within this area. (D1)*

*12.2 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

*Introduction to Special Relativity and Cosmology  
The distance scale; Redshif;, Hubble constant; Feynmann light clock and time dilation; Lorentz constraction and simultaneity derived with light ray signals; Lerentz transformation and invariant interval; Light cones; Special relativistic paradoxes; Cosmological principle; Space expansion and concept of critical density, closed, open and flat universe; The problem of missing matter.*

*Introduction to, Planetary and Space Science  
Solar system; Theory of orbital dynamics; Kepler’s Laws; Earth-moon system; Tidal force and the consequent phenomena; Rocket equation; Basic components of spacecraft.*

*Introduction to Astronomy*

*Astronomical coordinate systems; Positions and motions of stars; Stellar luminosity and magnitudes; Magnitude systems and the color of stars; Lluminosity; Stellar temperatures; luminosity and radi;. Stellar spectral classification; Line strength and formation. Hertzsprung-Russell diagram, mass-Luminosity relation.*

*Introduction to Particle Physics*

*Discovery of elementary particles. The concept of four different forces and fields in classical and quantum physics; Introduction to virtual particles and discovery of different particles for different type of interaction forces; Standard model of particles.*

*Introduction to Space Science*

*Rocket equation. Basic components of spacecraft.*

1. Indicative Reading List

*Core:*

*Physics (fifth edition), Tipler, P.S, Mosca, G., 2008*

*Introduction to Astronomy and Cosmology, Morison I., 2008*

*An introduction to Modern Astrophysics, Carrol and Ostlie, 2013*

*Recommended:*

*Introduction to Special Relativity, Rindler, W. 1991*

*Introduction to Planetary Science, Faure, G. & Mensing, T.M., 2008*

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 (30 hours); workshop/revision session (3 hours)*

*Total study time 150 hrs (including private study time)*

*Achievement of learning outcomes:*

* *Lectures (11.1, 11.2)*
* *Workshop/revision sessions (11.2-11.5, 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 homework and class tests 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). 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.*

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 where module will be delivered:

*Canterbury*