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

#  *PH608 The Sun, The Earth and Mars*

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 2015-16*

1. The number of students expected to take the module

*20*

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 Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal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])
*H*.
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 2.*

1. Prerequisite and co-requisite modules

*Completion of the following modules:*

*First year mathematics, PH300
First year physics PH301*

*First year Introduction to Astrophysics, Space Science and Cosmology PH304*

*Second year Atomic and Nuclear Physics PH503*

*Second year Spacecraft Systems and Engineering PH508*

1. The programmes of study to which the module contributes

*Astronomy Space Science and Astrophysics (BSc, MPhys)*

1. The intended subject specific learning outcomes
	1. *Knowledge and understanding of physical laws and principles in Solar System Science, and their application to diverse areas of physics. (A1)*
	2. *Aspects of the theory and practice of astronomy, astrophysics and space science, and of those aspects upon which astronomy, astrophysics and space science depends. (A2)*

*11.3 An ability to identify relevant principles and laws when dealing with problems in Solar System Science, and to make approximations necessary to obtain solutions. (B1)*

*11.4 An ability to solve problems in Solar System Science using appropriate mathematical tools. (B2)*

*11.5 An ability to use mathematical techniques and analysis to model physical behaviour in Solar System Science. (B4)*

*11.6 An ability to comment critically on how spacecraft are designed, their principles of operation, and their use to access and explore space, and on how telescopes (operating at various wavelengths) are designed, their principles of operation, and their use in astronomy and astrophysics research. (B5)*

*11.7 An ability to present and interpret astronomy, astrophysics and space science information graphically. (C2)*

*11.8 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

*Aims:
To understand the nature of the solar activities, emissions and its properties, and its effects on the Earth’s atmosphere and the near-Earth space within which spacecraft operate.
To have a familiarity with the modes of operation of remote sensing and communications satellites, understanding their function and how their instruments work
To be familiar with the current space missions to Mars and their impact on our understanding of that planet.*

*Solar Terrestrial physics
The sun: Overall structure, magnetic field and solar activities.
Interactions with Earth: plasma physics, solar wind, Earth’s magnetic field.
 Ionospheric physics. Terrestrial physics: Earth’s energy balance, Atmosphere. Environmental effects

Remote Sensing
Modes of operation of remote sensing satellite instruments: radio, microwave, visual and infrared instruments. Basic uses of the instruments. Digital image processing, structure of digital images, image-processing overview, information extraction. environmental applications: UV radiation and Ozone concentration, climate and weather.*

*Martian Science
An overview of recent and future Mars space missions and their scientific aims. Discussions of the new data concerning Mars and the changing picture of Mars that is currently emerging*

1. Indicative Reading List

*Core:*

*Physical Principles of Remote Sensing; Rees, Gareth 2001*

*Terrestrial Physics; 2013*

*The Scientific Exploration of Mars; Taylor, F. W. 2010*

*Recommended:*

*Physics of the Sun: A First Course; Mullan, Dermott J. 2010*

*Mars: A Warmer, Wetter Planet; Kargel, J. S. 2004*

*Introduction to the physics and techniques of remote sensing, Elachi, 2nd Edition, 2006*

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); workshops/revision sessions (3 hours)*

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

*Achievement of module learning outcomes:*

* *Lectures (11.1-11.3, 11.6, 2.2)*
* *Workshop/revision sessions (11.3-11.5, 11.7, 12.1)*
* *Self-study (11.8, 12.2)*
1. Assessment methods and how these relate to testing achievement of the intended module learning outcomes

*Coursework (class tests) 30%*

*Final (written, unseen, length 2 hours) exam 70%*

*The above assessments test students’ knowledge and understanding of the laws and principles of astronomy, astrophysics and space science (11.1, 11.2, 11.6, 12.2) and application of techniques to model behaviour and solve problems (11.3, 11.4, 11.5, 11.7, 2.1). In preparing for the assessments, students will need to manage their own revision using reference materials (11.8, 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*