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

*PH513 Medical Physics*

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 in 2015-16*

1. The number of students expected to take the module

*110*

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 Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal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

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 2.*

1. Prerequisite and co-requisite modules

*Prerequisites and co-requisites: PH301 (or replacement modules PH321, PH322, PH323), PH504.*

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)*

*This is not available as a wild module*

1. The intended subject specific learning outcomes
	1. *Knowledge and understanding of physical laws and principles, and their applications in medical physics. (A1).*
	2. *Knowledge and understanding of ionising radiations, with special reference to adverse health effects, to principles relating to radiation dose, and to measures necessary to protect people from the effects of ionising radiations*
	3. *Knowledge of medical imaging principles, techniques and applications using X-rays, radionuclides, ultrasound and optical radiation.*
	4. *Knowledge of therapeutic principles using unsealed sources of radiation in vivo and external radiation sources*
	5. *An ability to identify relevant principles and laws when dealing with problems involving measurements or tasks medical physics, with the ability to make assumptions or approximations in order to obtain solutions*
	6. *An ability to solve problems in medical physics using appropriate mathematical tools. (B2)*
	7. *An ability to use mathematical techniques and analysis to model physical behaviour. (B4)*
	8. *An ability to present and interpret information graphically within a medical physics context. (C2)*
	9. *An ability to make use of appropriate texts, research-based materials or other learning resources 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 of applications of physics laws to health sciences, 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, to construct logical arguments and to use technical language correctly 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

*The aim of the module in Medical Physics is to provide a primer into this important physics specialisation. The range of subjects covered is intended to give a balanced introduction to Medical Physics, with emphasis on the core principles of medical imaging, radiation therapy and radiation safety. A small number of lectures is also allocated to the growing field of optical techniques. The module involves several contributions from the Department of Medical Physics at the Kent and Canterbury Hospital.

SYLLABUS:

Radiation protection (radiology, generic); Radiation hazards and dosimetry, radiation protection science and standards, doses and risks in radiology; Radiology; (Fundamental radiological science, general radiology, fluoroscopy and special procedures); Mammography (Imaging techniques and applications to health screening); Computed Tomography (Principles, system design and physical assessment); Diagnostic ultrasound (Pulse echo principles, ultrasound imaging, Doppler techniques); Tissue optics (Absorption, scattering of light in the tissue); The eye (The eye as an optical instrument); Confocal Microscopy (Principles and resolutions); Optical Coherence Tomography (OCT) and applications; Nuclear Medicine (Radionuclide production, radiochemistry, imaging techniques, radiation detectors); In vitro techniques (Radiation counting techniques and applications); Positron Emission Tomography (Principles, imaging and clinical applications); Radiation therapies (Fundamentals of beam therapy, brachytherapy, and 131I thyroid therapy); Radiation Protection (unsealed sources); Dose from in-vivo radionuclides, contamination, safety considerations.*

1. Indicative Reading List

*Physics for medical imaging; Farr, R.F. & Allisy-Roberts, P.J. (2006)*

*Medical imaging physics; Hendee, W.R. & Ritenour, E.R. (2002)*

*Physics in nuclear medicine; Cherry, S.R., Sorenson, J.A. & Phelps.M.E. (2003)*

*A practical approach to medical image processing [with cd-rom]; Berry, E. (2008)*

*Confocal microscopy; Wilson,T. (ed.) (1990)*

*Handbook of biological confocal microscopy; Pawley, J.B. (ed.) (1990)*

*Handbook of optical coherence tomography; Bouma, B.E. & Tearney, G.J. (eds.) (2002)*

*Optical coherence tomography, technology and applications; Drexler, W. & Fujimoto, J.G. (eds.) (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 sessions (3 hours)*

*This module is expected to occupy 150 total study hours, including the contact hours above.*

*Achievement of module learning outcomes:*

* *Specific learning outcomes* *11.1, 11.2, 11.3, 11.4, 11.5, 11.6, 11.7, 11.8 and 11.9 will be achieved by lectures and revision classes;*
* *Generic learning outcomes* *12.1, 12.2 will be achieved by revision classes and class tests;*
1. Assessment methods and how these relate to testing achievement of the intended module learning outcomes

*Written (unseen) examination - 2 hours: 70%; Class tests: 30%*

*The above assessments test students’ knowledge and understanding of laws and principles (11.1, 11.2, 11.3, 11.4, 11.5, 12.2) and application of techniques to model behaviour and solve problems (11.6, 11.7, 11.8, 12.1, 12.2). In preparing for the assessments, students will need to manage their own revision using reference materials (11.9, 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.*