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

*PH606 Solid State 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 2015-16*

1. The number of students expected to take the module

*100.*

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 Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal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

1. 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

*PH300, PH301 (or replacement modules PH321 and PH323), and PH502,*

1. The programmes of study to which the module contributes

*Physics, Physics with Astrophysics (BSc, BSc with Foundation Year, BSc with Year in Industry, 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 Solid State Physics, and their application to diverse areas of physics. (A1)*

*11.2 An ability to identify relevant principles and laws when dealing with problems in Solid State Physics, and to make approximations necessary to obtain solutions. (B1)*

*11.3 An ability to solve problems in Solid State Physics using appropriate mathematical tools. (B2)*

*11.4 An ability to use mathematical techniques and analysis to model physical behaviour in Solid State Physics. (B4)*

*11.5 An ability to present and interpret information 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

*To provide an introduction to solid state physics. To provide foundations for the further study of materials and condensed matter, and details of solid state electronic and opto-electronic devices.*

*Structure*

*Interaction potential for atoms and ions. Definitions, crystal types. Miller indices. reciprocal lattice. Diffraction methods.*

*Dynamics of Vibrations*

*Lattice dynamics, phonon dispersion curves, experimental techniques.*

*Electrons in k-space: metals*

*Free electron theory of metals. Density of states. Fermi-Dirac distribution. Band theory of solids - Bloch’s theorem. Distinction between metals and insulators. electrical conductivity according to classical and quantum theory. Hall effect.*

*Semiconductors*

*Band structure of ideal semiconductor. Density of states and electronic/hole densities in conduction/valence band. Intrinsic carrier density. Doped semiconductors..*

*Magnetism*

*Definitions of dia, para, ferromagnetism. magnetic moments. General treatment of paramagnetism, Curie’s law. Introduction to ferromagnetism.*

1. Indicative Reading List

*Core Text:*

*Hook & Hall, Solid State Physics, Wiley [QC176]*

*Recommended:*

*Kittel, Solid State Physics (7th Ed), Wiley, 1996 [QC176]*

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/revision sessions (3 hours)*

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

*Achievement of module learning outcomes:*

* *Lectures (11.1-11,5)*
* *Workshop/revision sessions and 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 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, 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*

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.*