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

*PH322 Electricity and Light*

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 from 2015-16*

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 Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal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

1. Prerequisite and co-requisite modules

*Co-requisites PH321 Mechanics,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 electricity and light, and their application to diverse areas of physics. (A1)*
   2. *An ability to identify relevant principles and laws of electricity and light when dealing with problems, and to make approximations necessary to obtain solutions. (B1)*
   3. *An ability to solve problems involving electricity and light using appropriate mathematical tools. (B2)*
   4. *An ability to use mathematical techniques and analysis to model behaviour involving electricity and light. (B4)*
   5. *An ability to present and interpret information relating to electricity and light graphically. (C2)*
   6. *An ability to make use of appropriate texts, research-based materials or other learning resources about electricity and light 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

*Properties of Light and Optical Images; Wave nature of light. Reflection, refraction, Snell’s law, total internal reflection, refractive index and dispersion, polarisation. Huygens' principle, geometrical optics including reflection at plane and spherical surfaces, refraction at thin lenses, image formation, ray diagrams, calculation of linear and angular magnification, magnifying glass, telescopes and the microscope.*

*Electric Field; Discrete charge distributions, charge, conductors, insulators, Coulomb’s law, electric field, electric fields lines, action of electric field on charges, electric field due to a continuous charge distribution, electric potential, computing the electric field from the potential, calculation of potential for continuous charge distribution.*

*Magnetic Field; Force on a point charge in a magnetic field, motion of a point charge in a magnetic field, mass spectrometer and cyclotron.*

*Electric current and Direct current circuits, electric current, resistivity, resistance and Ohm’s Law, electromotive force, ideal voltage and current sources, energy and power in electric circuits, theory of metallic conduction, resistors in series and in parallel, Kirchhoff’s rules and their application to mesh analysis, electrical measuring instruments for potential difference and current, potential divider and Wheatstone’s bridge circuits, power transfer theorem, transient current analysis in RC, RL, LC and LRC circuits using differential equations.*

*Alternating Current Circuits; Phasor and complex number notation introduced for alternating current circuit analysis, reactance and complex impedance for Capacitance and Inductance, application to LRC series and parallel circuits. Series and parallel resonance, AC potential dividers and filter circuits, Thevenin's theorem, AC bridge circuits to measure inductance and capacitance, mutual inductance, the transformer and its simple applications.*

1. Indicative Reading List

*CORE:*

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

*BACKGROUND:*

*Schaum’s outline of theory and problems of electric circuits; Nahvi, M. & Edminister, J. (2003)*

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 (6 hours)*
* *The number of independent learning hours, including assignments 120 hrs*
* *Total number of study hours 150 hrs*

Achievement of module learning outcomes:

* *Lectures (11.1-5)*
* *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*

***~~If the module is part of a programme in a Partner College or Validated Institution, please complete the following:~~***

1. ~~Partner College/Validated Institution:~~
2. ~~University School responsible for the programme:~~