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

………March 11th 2015………………………………………….

**MODULE SPECIFICATION**

1. Title of the module

*PH300 Mathematics*

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

*140*

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 Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal

*None. Existing module.*

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

*30 (15 ECTS)*

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

*Terms 1 and 2*

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
	1. *An ability to solve problems in physics using appropriate mathematical tools. (B2)*
	2. *An ability to present and interpret information graphically. (C2)*
	3. *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; 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

*Derivatives and Integrals: Derivatives of elementary functions, chain rule, product rule, Integrals of elementary functions, Evaluation by substitution, Integration by parts, Area under the graph of a function.
Elementary Functions: Binomial coefficients, expansions and series, Maclaurin series, Taylor series, Exponential functions, Hyperbolic functions, Inverse functions.
Functions of a single variable: Linear and quadratic functions, polynomials, rational functions, limits, infinite series, approximation of functions.
Complex numbers: Quadratic equations, Argand diagram, modulus, Argument, complex exponential, de Moivre’s theorem, roots of polynomials.
Vectors: Basic properties, linear dependence, scalar and vector products, triple products, vector identities.
Matrices: Matrix representation, systems of equations, products, inverses, determinants, solution of linear systems, eigenvalues and eigenvectors, transformations.
Differential Equations: Solving differential equations, separable equations, linearity, homogeneity, first and second order equations, particular integrals. Boundary and initial values, auxiliary equations with complex roots, coefficients and terms, examples from physics.
Partial Derivatives: functions of two variables , directional derivatives, function of a function, Taylor expansions, stationary points.
Differentials and Integrals: perfect differential, chain rule, multiple integrals, integrals over areas, change of order of integration.
Introduction to Vector Calculus : Gradients, Divergence, Gauss’s theorem, Curl, Stokes’ theorem.
Polar Coordinates : Cylindrical polar coordinates in two and three dimensions, integrals, spherical coordinates, solid angle.*

1. Indicative Reading List

*Engineering Mathematics (6th Ed.); Stroud, K.A. & Booth, D.J. (2007)*

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

*48 hours of lectures related to learning outcomes 11.1, 11.2, 11.3, 12.1 and 12.2; 40 hours of workshops related to learning outcomes 11.1, 11.2, 11.3, 12.1 and 12.2. Guidance on weekly assessments (related to learning outcomes 11.1, 11.2, 11.3, 12.1 and 12.2) is given in workshops, and students are expected to spend an extra 1-2 hours a week finalising their work for submission.*

1. Assessment methods and how these relate to testing achievement of the intended module learning outcomes

*Coursework, including class tests: 40%. Final Examination: 60% consisting of two separate exams each of length 2 hours (30% each).*

*The above assessments test students’ ability to analyse information and represent it graphically (11.2, 12.2) and to apply techniques to solve problems (11.1, 12.1). In preparing for the assessments, students will need to manage their own revision using reference materials. (11.3)*

1. Implications for learning resources, including staff, library, IT and space

*None, existing 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*