1. **Title of the module**

PHYS3120 (PH312) - Mathematics II

1. **School or partner institution which will be responsible for management of the module**

Physical Sciences

1. **The level of the module (Level 4, Level 5, Level 6 or Level 7)**

Level 4

1. **The number of credits and the ECTS value which the module represents**

15 credits (7.5 ECTS)

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

Spring

1. **Prerequisite and co-requisite modules**

UK A Level Mathematics Examinations with a normal minimum attainment of a Grade C on the main Mathematics A Level.

Any generally accepted equivalent of this content and attainment is regarded as an acceptable prerequisite.

1. **The programmes of study to which the module contributes**

BSc/BSc with Foundation Year/BSc with Year in Industry/MPhys/MPhys with Year Abroad Physics

BSc/BSc with Year in Industry/MPhys/MPhys with Year Abroad Physics with Astrophysics

BSc/BSc with Year in Industry/MPhys/MPhys with Year Abroad Astronomy, Space Science and Astrophysics

This is not available as a wild module.

1. **The intended subject specific learning outcomes.
On successfully completing the module students will be able to:**

Have:

8.1 An ability to solve problems in physics using appropriate mathematical tools. (B2)

8.2 An ability to present and interpret information graphically. (C2)

8.3 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.
On successfully completing the module students will be able to:**

Have a knowledge and understanding of:

9.1 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)

9.2 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**

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 , partial derivatives, directional derivatives, functions many variables, higher derivatives, function of a function, implicit differentiation, differentiation of an integral w.r.t a parameter, Taylor expansions, stationary points.

Elementary multivariate Calculus: the chain rule, multiple integrals, integrals over rectangles/irregular areas in the plane, change of order of integration.

Polar Coordinates: Cylindrical polar coordinates in two and three dimensions, integrals, spherical coordinates, solid angle.

Introduction to Vector Calculus: Gradients, Divergence, Gauss's theorem, Curl, Stokes' theorem.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**
* Engineering Mathematics (7th Ed.); Stroud, K.A. & Booth, D.J. (2013)
1. **Learning and teaching methods**

Total contact hours: 36

Private study hours: 114

Total study hours: 150

1. **Assessment methods**
	1. Main assessment methods

IC Test (45 mins, 10%)

Assignment 1 (0.5 hours, 1.66%)

Assignment 2 (0.5 hours, 1.66%)

Assignment 3 (0.5 hours, 1.66%)

Assignment 4 (0.5 hours, 1.66%)

Assignment 5 (0.5 hours, 1.66%)

Assignment 6 (0.5 hours, 1.66%)

Assignment 7 (0.5 hours, 1.66%)

Assignment 8 (0.5 hours, 1.66%)

Assignment 9 (0.5 hours, 1.66%)

Assignment 10 (0.5 hours, 1.66%)

Assignment 11 (0.5 hours, 1.66%)

Assignment 12 (0.5 hours, 1.66%)

Examination (2 hours, 70%)

13.2 Reassessment methods

Like-for-like

1. **Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section12) and methods of assessment (section 13)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | *8.1* | *8.2* | *8.3* | *9.1* | *9.2* |
| **Learning/ teaching method** |  |  |  |  |  |
| Lectures | **X** | **X** | **X** |  |  |
| Workshops | **X** | **X** | **X** | **X** | **X** |
| Self-studies | **X** | **X** | **X** | **X** | **X** |
| **Assessment method** |  |  |  |  |  |
| Coursework | **X** | **X** | **X** | **X** | **X** |
| Final exam | **X** | **X** | **X** | **X** | **X** |

1. **Inclusive module design**

The School recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

1. **Campus(es) or centre(s) where module will be delivered**

Canterbury

1. **Internationalisation**

Mathematics is an international subject with concepts developed and refined by mathematicians across the globe. Mastery of the subject-specific learning outcomes will equip students to apply the theories and techniques of this module in a wide range of international contexts. The module team is drawn from the School of Physical Sciences, which includes many members of staff with international experience of teaching and research collaboration. In compiling the reading list, consideration has been given to the range of texts that are available internationally and a selection of texts has been identified to complement the delivery of the material. The support SPS provides to its students is also internationally attuned given our international student body.

**FACULTIES SUPPORT OFFICE USE ONLY**

**Revision record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Date approved | Major/minor revision | Start date of the delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
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Revised FSO Jan 2018