1. KentVision Code and title of the module

PHYS5310 – Numerical and Computational Methods

## Division and School/Department or partner institution which will be responsible for management of the module

Division of Natural Sciences (Physics and ASSA)

## The level of the module (Level 4, Level 5, Level 6 or Level 7)

Level 5

## The number of credits and the ECTS value which the module represents

15 Credits (7.5 ECTS)

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

Spring

## Prerequisite and co-requisite modules and/or any module restrictions

None

## The course(s) of study to which the module contributes

Compulsory for the following courses:

BSc (Hons) Physics (including variant with a professional Placement)

MPhys Physics (including variant with a Year Abroad)

BSc (Hons) Physics with Astrophysics (including variant with a Professional Placement)

MPhys Physics with Astrophysics (including variant with a Year Abroad)

Not available as an elective module

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

8.1 Demonstrate knowledge and understanding of theorems in pure and applied mathematics which have relevance to the physical sciences

8.2 Formulate and solve problems in physics numerically.

8.3 Analyse mathematical problems and select appropriate mathematical theorems and techniques for their solution using numerical and computational methods.

8.4 Quantitatively describe and predict real physical phenomena using mathematics.

8.5 Carry out algebraic manipulations, differentiate, and integrate, when solving mathematical problems.

8.6 Use computer programming to solve problems.

## The intended generic learning outcomes. On successfully completing the module students will be able to:

9.1 Demonstrate problem solving skills.

9.2 Demonstrate investigative skills (including information retrieval).

9.3 Demonstrate analytical skills (including working with details and evaluating ideas).

9.4 Demonstrate personal skills working independently (e.g. to use initiative and originality, be organised and meet deadlines).

9.5 Demonstrate ICT skills (e.g. to use Moodle and internet resources).

## A synopsis of the curriculum

This module introduces and develops a knowledge of numerical approximations to solve problems in physics, building on the programming skills gained in earlier stages. In addition, it complements the analytical methods students are trained to use and extends the range of tools that they can use in later stages of the degree. This module covers for example how to solve linear equations, how to find eigenvalues and numerical integration and differentiation.

## Reading list

## The University is committed to ensuring that core reading materials are in accessible electronic format in line with the Kent Inclusive Practices.

## The most up to date reading list for each module can be found on the university's [reading list pages](https://kent.rl.talis.com/index.html).

## Contact Hours

Private Study: 120

Contact Hours: 30

Total: 150

## Assessment methods

13.1 Main assessment methods

* Problem Set 1 (3 hours) – 20%
* Problem Set 2 (3 hours) – 20%
* Problem Set 3 (3 hours) – 20%
* Problem Set 4 (3 hours) – 20%
* Problem Set 5 (3 hours) – 20%

13.2 Reassessment methods

* Like-for-like

## Map of module learning outcomes (sections 8 & 9) to learning and teaching methods (section 12) and methods of assessment (section 13)

**Module learning outcomes against learning and teaching methods:**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Problem Solving | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** |  |  |

**Module learning outcomes against assessment methods:**

| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 9.1 | 9.2 | 9.3 | 9.4 | 9.5 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Problem Sets | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

## Inclusive module design

The Division 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

## Campus(es) or centre(s) where module will be delivered

Canterbury

## Internationalisation

The topics to be covered in this module were developed collaboratively by scientists in many countries over the course of generations. Throughout this module emphasis will be made on how contributions from scientists in different countries (with different science cultures) were combined to create the knowledge we have today. Like all established scientific knowledge, this transcends national boundaries.

**DIVISIONAL USE ONLY**

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

| Date approved | New/Major/minor revision | Start date of delivery of (revised) version | Section revised  (if applicable) | Impacts PLOs (Q6&7 cover sheet) |
| --- | --- | --- | --- | --- |
| 9 Dec 2021 | Minor | Sept 2022 | 13 | No |
|  |  |  |  |  |