1. **Title of the module**

PHYS5000 (PH500) - Physics Laboratory

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 5

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

30 credits (15 ECTS)

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

Autumn and Spring

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

None

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

Have:

1. An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions. (B1)
2. An ability to execute and analyse critically the results of an experiment or investigation and draw valid conclusions. To evaluate the level of uncertainty in these results and compare them with expected outcomes, theoretical predictions or with published data; thereby to evaluate the significance of their results in this context. (B3)
3. An ability to use mathematical techniques and analysis to model physical behaviour. (B4)
4. Competent use of appropriate C&IT packages/systems for the analysis of data and the retrieval of appropriate information. (C1)
5. An ability to present and interpret information graphically. (C2)
6. An ability to communicate scientific information, in particular to produce clear and accurate scientific reports. (C3)
7. A familiarity with laboratory apparatus and techniques, including relevant aspects of Health & Safety. (C4)
8. The systematic and reliable recording of experimental data. (C5)
9. An ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning. (C6)
10. **The intended generic learning outcomes.
On successfully completing the module students will be able to:**

Have a knowledge and understanding of:

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. Investigative skills in the context of independent investigation including the use of textbooks and other available literature, databases, and the interaction with colleagues to extract important information. (D2)
3. Communication skills in the area of dealing with surprising ideas and difficult concepts, including listening carefully, reading demanding texts and presenting complex information in a clear and concise manner. C&IT skills are an important element to this. (D3)
4. 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)
5. Personal skills – the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people. (D5)
6. **A synopsis of the curriculum**

Most practicing physicists at some point will be required to perform experiments and take measurements. This module, through a series of experiments, seeks to allow students to become familiar with some more complex apparatus and give them the opportunity to learn the art of accurate recording and analysis of data. This data has to be put in the context of the theoretical background and an estimate of the accuracy made. Keeping of an accurate, intelligible laboratory notebook is most important. Each term 3 three week experiments are performed. The additional period is allocated to some further activities to develop experimental and communications skills including communication to a non-specialist audience.

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1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**

Core Text:

* Kirkup L., Experimental Methods (John Wiley and Sons, 1994, ISBN 0471335797, paperback)

Recommended:

* Taylor J.R., An Introduction to Error Analysis (1997)
1. **Learning and teaching methods**

Total contact hours: 57

Private study hours: 243

Total study hours: 300

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

Assessment 1: (Laboratory book and 3000 word report, 12.50 %)

Assessment 2: (Laboratory book and 3000 word report, 12.50 % )

Assessment 3: (Laboratory book and 3000 word report, 12.50 % )

Written Communication: (2 pages + reference list, 6.25%)

Oral Communication: 6.25%

Assessment 4: (Laboratory book and 3000 word report, 16.60%)

Assessment 5: (Laboratory book and 3000 word report, 16.70%)

Assessment 6: (Laboratory book and 3000 word report, 16.70%)

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* | *8.4* | *8.5* | *8.6* | *8.7* | *8.8* | *8.9* | *9.1* | *9.2* | *9.3* | *9.4* | *9.5* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Laboratory sessions | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Communications session |  |  |  |  |  |  |  |  |  |  |  | **x** |  |  |
| Lectures | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** |  |  | **x** |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Lab Books and Reports | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Communication exercises |  |  |  |  |  |  |  |  |  |  |  | **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**

Physics is an international subject with physical laws discovered and techniques developed and refined by Physicists 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.**

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| --- | --- | --- | --- | --- |
| 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