1. **Title of the module**

PHYS6170 (PH617) - Physics Project 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 6

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)**

Autumn and Spring

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

None

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

BSc/BSc with Foundation Year Physics

BSc Physics with Astrophysics

BSc 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:

1. An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions for laboratory projects. (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 for project reports. (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)

1. **A synopsis of the curriculum**

Aims:

* To provide experience in laboratory based experimentation, data recording and analysis and drawing of conclusions.
* To develop report writing skills for scientific material.
* To develop the ability to undertake investigations where, as part of the exercise, the goals and methods have to be defined by the investigator.
* To develop skills in literature searches and reviews.

The module has two parts: Laboratory experiments and a mini-project. For half the term the students will work in pairs on a series of 3 two-week experiments. A report will be written by each student for each experiment.

Experiments include:

* Solar cells.
* NMR.
* Hall effect.
* Gamma ray spectroscopy.
* X-ray diffraction.
* Optical spectroscopy.

Mini-projects. For half the term, the students will work in pairs on a mini-project. These will be more open-ended tasks than the experiments, with only brief introductions stating the topic to be investigated with an emphasis on independent learning. A report will be written by each student on their project.

1. **Reading list (Indicative list, current at time of publication. Reading lists will be published annually)**
* An Introduction to Error Analysis; Taylor, J.R. (1997)
* Writing for Science and Engineering: Papers, Presentations and Reports; Silyn-Roberts, H. (2013)
* Scientists Must Write; Barrass, R. (2002)
1. **Learning and teaching methods**

Total contact hours: 55

Private study hours: 95

Total study hours: 150

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

Practical (16.7% - max. 10 pages)

Practical (16.7% - max. 10 pages)

Practical (16.6% - max. 10 pages)

Assignment (50% - max. 25 pages)

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** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Private Study** |  |  |  |  | **X** | **X** |  |  | **X** |  |  |  |  | **X** |
| *Experiments (Lab-based)* | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |  | **X** | **X** |
| *Mini-projects (Lab-based)* | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *Experiment write-ups (x3)* | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |
| *Mini-project assignment* | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** | **X** |

1. **Inclusive module design**

The Schoolrecognises 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.**

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