1. **Title of the module**

PHYS6180 (PH618) - Image Processing

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)**

Autumnn

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

None

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

BSc/BSc with Foundation Year & MPhys in Physics

BSc & MPhys in Physics with Astrophysics

BSc & MPhys in 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. Knowledge and understanding of laws and principles of imaging processing, and their application to diverse areas of physics. (A1)
2. An ability to solve problems in image processing using appropriate mathematical tools. (B2)
3. Competent use of appropriate C&IT packages/systems for the analysis of images and the retrieval of appropriate information. (C1)
4. An ability to present, process and interpret information graphically. (C2)
5. An ability to make use of appropriate texts, research-based materials or other learning resources as part of managing their own learning. (C6)
6. **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. 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**

Introduction to Matlab

• Image representation

• Image formation

• Grey-scale transformation

• Enhancement and extraction of image content

• Fourier transforms and the frequency domain

• Image restoration, geometrical transformations

• Morphology and morphological transformations

• Feature extraction

• Segmentation

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

* Fundamentals of digital image processing: a practical approach with examples in Matlab, Solomon, Chris, Breckon, Toby 2011, Wiley Blackwell, ISBN 0470844736
* Gonzalez and Woods, Digital Image Processing, Addison-Wesley, 1992, ISBN 0-201-50803-6
* John C. Russ, The Image Processing Handbook, CRC Press, 1995

• Matlab: A Practical Introduction to Programming and Problem Solving, Stormy Attaway, Elsevier, 2018, ISBN: 9780128154793

1. **Learning and teaching methods**

Total contact hours: 30

Private study hours: 120

Total study hours: 150

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

Take Home Test 1 (2 Hours, 15%)

Take Home Test 2 (2 Hours, 15%)

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 | 8.4 | 8.5 | 9.1 | 9.2 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |
| Assignments | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Examination | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

1. **Inclusive module design**

The School/Collaborative Partner *(delete as applicable)* 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**

Digital Image Processing is a subject of international interest with techniques developed and refined by scientists 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. 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 delivery of revised version | Section revised | Impacts PLOs (Q6&7 cover sheet) |
| 10/07/2019 | Minor | September 2019 | 11, 13 |  |
|  |  |  |  |  |