1. **Title of the module**

EENG5610 (EL561) Image Analysis and Applications

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

Computing, Engineering and Mathematical 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**

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**

For Computer Science students taking this module as an option:

CO322 Foundations of Computing or equivalent

1. **The courses to which the module contributes**

BEng Electronic and Computer Engineering with a Foundation Year

BEng/MEng Electronic and Computer Engineering

BEng/MEng Electronic and Computer Engineering with a Year in Industry

BEng Biomedical Engineering with a Foundation Year

BEng Biomedical Engineering

BEng Biomedical Engineering with a Year in Industry

BEng Mechanical Engineering with a Foundation Year

BEng Mechanical Engineering

BEng Mechanical Engineering with a Year in Industry

BSc Computer Science

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

1. Have a knowledge of the main methods of three principal integrated themes:

(i) image processing (representation, transformation, extraction of key information from images);

(ii) image analysis (automatic interpretation of images and pattern recognition methodology) and

(iii) computational architectures for image analysis (especially neural network structures).

2. Knowledge and critical understanding of algorithms underpinning modern image analysis systems.

3. Have experience and critical understanding of the requirements for implementing algorithms for image analysis.

4. Have practical experience of working with a range of typical algorithms and architectures.

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

1. Evaluate the appropriateness of different approaches to solving problems

2. Demonstrate key skills in information technology

3. Demonstrate key skills in application of number.

1. **A synopsis of the curriculum**

The module introduces fundamental techniques employed in image processing and pattern recognition providing an understanding of how practical pattern recognition systems may be developed able to address the inherent difficulties present in real world situations. The material is augmented with a study of biometric and security applications looking at the specific techniques employed to recognise biometric samples.

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

* Fairhurst, Michael Christopher (1988) Computer vision for robotic systems: an introduction, Prentice Hall, London, New York.
* Solomon, Chris (2011) Fundamentals of digital image processing : a practical approach with examples in Matlab. Wiley-Blackwell.
* Duda, Richard O.; Hart, Peter E.; Stork, David G. (2000) Pattern Classification, John Wiley and Sons.
* Picton, Phil. (2000) Neural Networks. 2nd edition. Palgrave, Basingstoke.
* Graupe, Daniel. (2019) Principles of Artificial Neural Networks – Basic Designs to Deep Learning. 4th Edn. World Scientific Publishing.
* Jain, Anil, Ross, Arun, Nandakumar, Karthik. (2011). Introduction to Biometrics. Springer.
* Jain, Anil, Flynn, Patrick, Ross, Arun (eds.). (2008). Handbook of Biometrics. Springer.

1. **Learning and teaching methods**

Total contact hours: 33

Private study hours: 117

Total study hours: 150

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

* Exam 2 hours - 80%
* 2 x Assignments - 10% each

13.2 Reassessment methods

100% examination (2 hours)

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 | 9.1 | 9.2 | 9.3 |
| **Learning/ teaching method** |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Example classes | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| **Assessment method** |  |  |  |  |  |  |  |
| Exam | **x** | **x** | **x** | **x** | **x** |  | **x** |
| Assignments | **x** | **x** | **x** | **x** | **x** | **x** | **x** |

1. **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

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

Canterbury

1. **Internationalisation**

Engineering is an international discipline 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. The engineering and software techniques introduced are in standard use worldwide and offer international employability opportunity. The module team 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 provided to the students is also internationally attuned given our international student body.

**DIVISION 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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