1. **Title of the module**

EENG6141 (EL614) Biomaterials

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

BEng BioMedical Engineering

BEng BioMedical Engineering with a Year in Industry

BEng Mechanical Engineering

BEng Mechanical Engineering with a Year in Industry

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

8.1. Demonstrate knowledge and conceptual understanding of the principles of mechanics of materials

8.2. Demonstrate knowledge and critical understanding of the structure and function of biomaterials in the human body

8.3. Demonstrate knowledge and critical understanding of the implications of using non-biological materials in the human body

8.4. Demonstrate knowledge and critical understanding of biomedical materials for specific applications

8.5. Demonstrate knowledge and systematic understanding of the processing of implants

8.6. Demonstrate knowledge and systematic understanding of the requirement for implant testing and evaluation

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

9.1. Deploy accurately established techniques of analysis and enquiry within a discipline.

9.2. Communicate more effectively using a variety of methods.

9.3. Critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), to make judgements and propose solutions.

9.4. Exercise initiative and personal responsibility to manage their time and resources within a project.

1. **A synopsis of the curriculum**

Biomaterials are those materials intended to interface with biological systems to assess, treat, support or replace any tissue, organ or function of the body. The aim of this module is to provide the students with the understanding of biomaterials with special reference to their interaction with the biological environment. To achieve this, the module introduces firstly mechanics of materials, by explaining the concepts such as stress, strain, bending and shear. Subsequently the module provides examples of biomaterials and how they are used in the human body.

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

* Mechanics of Materials - Beer, Johnston, Dewolf. McGraw-Hill Higher Education, 7th edition, 2015
* Biomaterials Science: An Introduction to Materials in Medicine - Ratner et al. Academic Press, 3rd edition, 2012

1. **Learning and teaching methods**

Total contact hours: 38

Private study hours: 112

Total study hours: 150

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

* Exam 2 hours (75%)
* Laboratory report – typically 5 pages (15%)
* Assignment – typically 3 pages + 10 min video (10%)

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* | *9.1* | *9.2* | *9.3* | *9.4* |
| **Learning/ teaching method** |  |  |  |  |  |  |  |  |  |  |
| Private Study | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Labs | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Example classes | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Lectures | **x** | **x** | **x** | **x** | **x** | **x** |  |  |  |  |
| **Assessment method** |  |  |  |  |  |  |  |  |  |  |
| Lab Reports | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| Assignment | **x** | **x** |  | **x** |  |  | **x** | **x** | **x** | **x** |
| Examination | **x** | **x** | **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**

Internationally recognised books are used to present the material presented in this course.

The module will use internationally developed and recognised notation and mathematics models for stress analysis of biomaterials. 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.

**DIVISIONAL 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) |
|  |  |  |  |  |
|  |  |  |  |  |