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## MODULE DESCRIPTOR

### Module Title

Biomaterials

Reference	EN3607	Version	1
Created	March 2018	SCQF Level	SCQF 9
Approved	March 2018	SCQF Points	15
Amended		ECTS Points	7.5

### Aims of Module

To develop an understanding of the properties of natural and synthetic materials used in contact with biological systems and its effect. To develop an understanding of engineering principle materials in context of its applications in therapeutic, prosthetic, microdevice and diagnostic context.

### Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Critically evaluate the mechanical behaviour of biological tissues and synthetic materials (such as polymer, ceramics, metals) under static and dynamic conditions.
- 2 Identify and understand the degradation of the materials in biological environment, reaction of body to foreign materials and concepts of bioactive/bioinert materials.
- 3 Draw on range of biomaterial properties, mechanical theories, manufacturing processes and biological constraints in designing biomedical engineering related products such as implants, prostheses and devices.

### Indicative Module Content

1. Properties of materials, specific to biological (bone, soft tissues) and non-biological (metals, plastics, ceramics); 2. Mechanical testing (static and dynamic testing, stress-strain curves); 3. Design of replacement joint prostheses and choice of material / fitness for purpose based on the biomechanics of walking, running, jumping, and bending; 4. Biomaterials selection, manufacturing and characterisation for the dental, ophthalmological and tissue engineering applications.

### Module Delivery

This is a lecture, laboratory and tutorial based full time course, with case study work, plus private study and discussion.

**Indicative Student Workload**

	Full Time	Part Time
Contact Hours	30	N/A
Non-Contact Hours	120	N/A
Placement/Work-Based Learning Experience [Notional] Hours	N/A	N/A
TOTAL	150	N/A
Actual Placement hours for professional, statutory or regulatory body		

**ASSESSMENT PLAN**

If a major/minor model is used and box is ticked, % weightings below are indicative only.

**Component 1**

Type:	Coursework	Weighting:	50%	Outcomes Assessed:	1, 3
Description:	Coursework assessing ability to plan and test engineering materials for measuring range of properties.				

**Component 2**

Type:	Examination	Weighting:	50%	Outcomes Assessed:	2
Description:	Assessment of an ability to design device, select the material ,select the manufacturing process for biomedical applications.				

**MODULE PERFORMANCE DESCRIPTOR****Explanatory Text**

To pass the module, you must achieve a 40% weighted average mark from the exam and coursework. In addition you need to achieve at least 35% in both the individual exam and coursework components.

Module Grade	Minimum Requirements to achieve Module Grade:
<b>A</b>	=>70% and above
<b>B</b>	60-69%
<b>C</b>	50-59%
<b>D</b>	40-49%
<b>E</b>	35-39%
<b>F</b>	0-34%
<b>NS</b>	Non-submission of work by published deadline or non-attendance for examination

**Module Requirements**

Prerequisites for Module	None.
Corequisites for module	None.
Precluded Modules	None.

**INDICATIVE BIBLIOGRAPHY**

- 1 RATNER, H. and SCHOEN, L., 2012. Biomaterial Science. 3rd ed. Academic Press.
- 2 TEMENOFF, M., 2008. Biomaterials. London: Pearson.
- 3 SCREEN, H.R.C. and TANNER, K.E., 2012. Structure and biomechanics of biological composites. In: NICOLAIS, L., BORZACCHIELLO, A. and LEE, S.M., eds. Encyclopedia of Composites. 2nd ed. Oxford: Wiley-Blackwell. pp. 2928-2939.