

Biomaterials with implant design and technology

Module Code:	MHT6013-B
Academic Year:	2018-19
Credit Rating:	20
School:	Department of Biomedical and Electronics Engineering
Subject Area:	Medical and Healthcare Technology
FHEQ Level:	FHEQ Level 6
Module Leader:	Dr Mansour Youseffi

Additional Tutors:

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	48
Tutorials	12
Laboratory	12
Directed Study	126
Examinations DO NOT USE	2

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims

For semester one, this module aims to develop the critical knowledge base biomaterials (including tissues and tissue replacement materials), their properties, design, testing, evaluation and processing for orthopaedic applications.

For semester two the module also aims to integrate and apply existing knowledge to

implant design and technology and to apply general design procedures/methodology to medical devices such as joint replacements, including hip, knee and other joints.

Outline Syllabus

For biomaterials in semester 1: Introduction to biomaterials: Applications, Properties and Processing.

Pre-requisites of biomaterials (biocompatibility concepts).

Structure and properties of tissues, metals, polymers/composites and ceramics as biomaterials.

Surface engineering of biomaterials, processing and forming techniques.

Degradation of biomaterials, corrosion, biotribology (wear, friction and lubrication), and adsorption.

Case study 1: Production, design, properties, selection and evaluation of ceramic femoral heads/cups).

Case study 2: Fracture fixation devices such as bone plates and screws.

Legislative aspects, patents, pre-clinical and clinical trials.

For implant design and technology in semester 2: General design considerations including design procedures, design specifications and regulatory issues; Surgical considerations; Bearing surfaces; Implant fixation; Implant loosening and wear; Implant manufacturing; Pre-clinical evaluation of orthopaedic implants; Hip joint replacements; Knee joint replacements; Other joint replacements.

Module Learning Outcomes

On successful completion of this module, students will be able to...

- 1
 - 1.1 Critically evaluate the structure and properties of tissues
 - 1.2 Understand the important factors in selecting tissue replacement materials
 - 1.3 Know the regulations controlling biomaterials
- 2
 - 2.1 Select tissue replacement materials
- 3
 - 3.1 Present data
 - 3.2 Solve problems systematically

Learning, Teaching and Assessment Strategy

Concepts are introduced using formal lectures, tutorials, laboratory practicals, seminars and invited lectures from industry. Deeper/better understanding is developed during tutorials by solving practical problems. Oral feedback is given during tutorial and laboratory classes.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Laboratory Report	Two Case Studies including implant testing laboratory practicals	-3000 words	15%	No

Summative	Examination - closed book	Implant Design in Semester 2	2 hours	50%	Yes
Summative	Classroom test	Biomaterials in Semester 1	2 hours	35%	No

Legacy Code (if applicable)

ENG3309L

Reading List

To view Reading List, please go to [rebus:list](#).