

Regenerative Medicine

Module Code:	MHT7013-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 7 (Masters)

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	48
Tutorials	24
Directed Study	128

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Semester 1 (Sep - Jan)

Module Aims

To stimulate a multidisciplinary understanding of the concepts underlying regenerative medicine (tissue engineering and wound repair).

Outline Syllabus

This course will provide an overview of cell culture fundamentals, an extensive review on extracellular matrix, followed by topics on cell-cell and cell-matrix interactions. Subsequent lectures will cover the effects of physical (shear, stress, strain), chemical (Cytokines, growth factors), and electrical stimuli on cellular behaviour once cells attach to biomaterials as scaffolds. Tissue engineering will be introduced by reviewing tissue structure and function and the clinical need for tissue repair. An overview of scaffold design and processing for

tissue engineering will be reviewed and the application of tissue engineering to specialized tissues and organs will then be addressed in depth. Tissue engineering of specific organ systems will be discussed include skin, muscular skeletal system (vascular grafts, blood substitutions, cardiac patch, and heart valve), nervous system (peripheral and central nervous systems), liver, pancreas, and kidney.

History and fundamentals of tissue engineering; Cell sources; Tissue dynamics/cell migration; Biomaterials for tissue engineering; Bioreactors and cell culture techniques such as: sample and supplement preparation; cell counting and cell passage will be discuss in details.

Weeks 1: Course Structure and Introduction

Weeks 2: History of Cell and Tissue Engineering

Weeks 3: Basic Concept

Weeks 4: Getting started in the lab

Weeks 5: Essential lab skills for Tissue Engineering (Part 1)

Weeks 6: Essential lab skills for Tissue Engineering (Part 2)

Weeks 7: Essential lab skills for Tissue Engineering (Part 3)

Weeks 8: Cell and tissue isolation

Weeks 9: Tissue Engineering Application (Bone, and Cartilage and Breast)

Weeks 10: Tissue Engineering Application (Cornea, skin and hair)

Weeks 11: Problem Based Learning 1 plus Presentation)

Weeks 12: Problem Based Learning 2 plus Presentation 2

Module Learning Outcomes

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

- 1 Understand and apply the scientific method for cell culture and tissue engineering applications
- 2 Solve problems systematically mainly cell count, cell viability, population double time, measurement of fibre diameter, porosity and many more.
- 3 Understand the whole concept of tissue engineering from production to the clinic including materials selection, materials testing (biomaterials and biological testing), animal studies, human trial, production, sterilisation, and packaging.
- 4 Understand the whole concepts of regenerative medicine including bone, cartilage, cornea, skin, hair etc.

Learning, Teaching and Assessment Strategy

Key lectures will deliver core content, providing students with the opportunity to acquire the information to enhance their knowledge and understanding of subject LO 1,2,3,4. This will be done by interactive teaching sessions with many hands out and questions/answers (LO1,2,3). This will be complemented by few problem based learning (PBL) sessions and various examples in Practial Tissue Engineering to allow students to apply this learning principles (LO3,4).

Directed study provides students with the opportunity to undertake guided reading and to develop their own portfolio of learning to enhance transferable skills and knowledge LO 1,2,3,4.

Concepts, principles and theories explored in formal lectures and practised in tutorials. Cognitive and personal skills developed in problem solving exercises, tackled by working in small groups supported by members of academic staff. There will be formative assessments in the form of monthly quizzes followed by two set of summative assessments:

1) Group Presentations follow by PBL technique (LO3, 4).

2) Summative final exam (closed book) will assess all the learning outcomes expressed in the descriptor (LO1,2,3,4).

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Presentation	Group Presentation	30 minutes	30%	No
Summative	Examination - closed book	2 hour closed book exam	2 hours	70%	Yes
Referral	Examination - closed book		2 hours	100%	Yes

Legacy Code (if applicable)

Reading List

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