

Module Details	
Module Title	Regenerative Medicine
Module Code	MHT7013-B
Academic Year	2020/1
Credits	20
School	Department of Biomedical and Electronics Engineering
Subject Area	Medical and Healthcare Technology
FHEQ Level	FHEQ Level 7
Pre-requisites	N/A
Co-requisites	N/A

Contact Hours	
Type	Hours
Online Lecture (Synchronous)	24
Directed Study	176

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 1

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

Outline Syllabus

This online 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 discussed in detail.

Weeks 1: Course Structure and Introduction

Weeks 2: History of Regenerative Medicine + Scientific Writing (Getting ready for Coursework)

Weeks 3: Tissue Engineering Scaffolds

Weeks 4: Material Testing

Weeks 5: Tissue Engineering Application (Cornea) ? PBL*

Weeks 6: Tissue Engineering Application (Skin/Hair) ? PBL

Weeks 7: Tissue Engineering Application (Breast Cancer and Reconstruction) ? PBL

Weeks 8: Tissue Engineering Application (Bone and Cartilage) ? PBL

Weeks 9: Tissue Engineering Application (Ligament) ? PBL

Weeks 10: Cell and tissue isolation

Weeks 11: Decellularization

Weeks 12: Group Presentation

-*PBL: Problem Based Learning

Learning Outcomes

Outcome Number	Description
01	Understand and apply the scientific method for cell culture and tissue engineering applications
02	Solve problems systematically mainly cell count, cell viability, population double time, measurement of fibre diameter, porosity and many more.
03	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.
04	Understand the whole concepts of regenerative medicine including bone, cartilage, cornea, skin, hair etc.

Learning, Teaching and Assessment Strategy

Key online 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 a few problem-based learning (PBL) sessions and various examples in Practical 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.

Main Assessments:

There will be two sets of summative assessments:

- 1) Online Presentations (LO3, 4) - (20% total weight, 20 minutes presentation)
- 2) Summative final coursework (Report) will assess all the learning outcomes expressed in the descriptor (LO1,2,3,4). (80% total weight- 4500 words).

Students need to provide a coursework with 80% of total mark (max 4500 words) followed by an online individual presentation with 20% of total mark on a specific task given in the field of regenerative medicine.

Referral (Supplementary):

Student only need to repeat the element they failed.

If student fail the coursework ONLY:

Student need to provide a coursework only with 80% of total mark (Max 4500 words)

If student fail the Presentation ONLY:

Student need to answer one question ONLY which will cover failed presentation (20% of total mark).

If student fail BOTH coursework and Presentation:

Student need to submit coursework and also answer one question which has been described in coursework brief. The question is the replacement of presentation as there will be no presentation in supplementary period. Question need to be embedded within the coursework and submitted at the same time of coursework in a single file.

This module satisfies the below Learning Outcomes as specified by the Accreditation of Higher Education Programmes: Third Edition (AHEP3) as published by The Engineering Council in-line with the UK Standard for Professional Engineering Competence (UK-SPEC). These outcomes specify six key areas of learning: Science and Mathematics (SM), Engineering Analysis (EA), Design (D), Economic, Legal, Social, Ethical and Environmental Context (EL), Engineering Practice (P) and Additional General Skills (G). SM4m, SM6m, EA4m, EA5m, D2, D3m, D7m, EL2, P1, P2m, P3, P4, P6, P9m, P10m. Further details of these learning outcomes can be found at <https://www.engc.org.uk/>.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Presentation	Group Presentation (Supp Answer 1 Presentation Qn)	30 mins	20%
Summative	Coursework	Report 4500 Words	N/A	80%

Reading List

To access the reading list for this module, please visit <https://bradford.rl.talis.com/index.html>

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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