UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Regenerative Medicine
Module Code:	MHT7013-B
Academic Year:	2019-20
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	24
Directed Study	176

Availability	
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

Learning Outcomes	
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).

Students need to provide a coursework follow by a group presentation on a specific task in the

field of regenerative medicine. There will be a summative closed book exam at the end of semester.

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	30 minutes	30%
Referral	Examination - closed book		2 hours	100%
Summative	Examination - closed book	2 hour closed book exam	2 hours	70%

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.