

BMS4102: TECHNOLOGY FOR REGENERATIVE MEDICINE

Effective Term

Semester A 2022/23

Part I Course Overview

Course Title

Technology for Regenerative Medicine

Subject Code

BMS - Biomedical Sciences

Course Number

4102

Academic Unit

Biomedical Sciences (BMS)

College/School

Jockey Club College of Veterinary Medicine and Life Sciences (VM)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

Nil

Precursors

BCH2804 Molecules and cells, BMS2801 Molecules and cells, BCH2066 Cell Biology, BMS2803 Biology of Cells

Equivalent Courses

Nil

Exclusive Courses

BCH4057 Developmental and Regenerative Biology

BCH4080 Technology for Regenerative Medicine

Part II Course Details

Abstract

This course deals with the technologies being used in the field of regenerative medicine. The objective is to provide students with current scientific knowledge and technological practice of this exciting field which explores the repair, regeneration, or replacement of damaged tissues and failed organs. The student will examine the underlying principles of the normal processes of repair and regeneration in humans. Various processes on the tissue, organ and organism levels will be used as illustrative examples to highlight conserved principles governing tissue repair and regeneration. Conceptual understanding on the common and different paradigms observed in repair, regeneration and replacement will be emphasized. The students will learn about technological breakthroughs in stem cell therapy, biotechnology, biologically-inspired materials and pharmaceutical studies. This course will introduce the latest methods in regulating and modulating the biological, chemical and mechanical properties in novel bioengineered constructs. The student will integrate their prior knowledge of cell and molecular biology, tissue engineering and genetics, to analyse the regulation of processes leading to the repair and regeneration of tissues and organs. This course builds on knowledge covered in Molecules and Cells, and complements Tissue Engineering and Final Year Project.

Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Distinguish the different patterns of tissue repair and organregeneration in humans	20	x	x	
2 Relay key molecular players and modulating factors in therapies of tissue repair and organ regeneration in animal models and humans	20		x	x
3 Compare and contrast the operational principles of molecular therapy, stem cell therapy, biologically-inspired materials and novel biomaterials	20		x	x
4 Comprehend and evaluate current literature on biologicalfunctionality and compatibility, and applications of micro- and nanotechnologies in regenerative medicine	20		x	x
5 Comprehend and evaluate current literature on novel approaches in stem cell therapies	20		x	x

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Teaching and Learning Activities (TLAs)

	TLAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lectures	Students will learn in lectures on the tissue repair and organ regeneration in humans; and on common operational principles in the emerging technologies of molecular and stem cell therapies, and on novel tissue engineering and biomaterials	1, 2, 3	30 hrs
2	Lab practical	Students will examine the involvement of key molecules in an animal model of regeneration, stem cell biology and biomaterials in 3 lab practicals.	1, 2, 3	9 hrs
3	Oral presentations	Students will perform literature review and will deliver two oral presentations on the applications of knowledge derived from regenerative medicine	4, 5	4 hrs
4	Quiz	Students will take a quiz on the overview of regenerative biology and of regeneration of skin wounds and neural tissues	1, 2	2 hrs
5	Office Hours	Students will discuss with professors on the topics covered in this course	1, 2, 3	6 hrs

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Quiz	1, 2, 3	10	
2	Lab report	1, 2, 3	15	
3	Oral presentations	4, 5	5	

Continuous Assessment (%)

30

Examination (%)

70

Examination Duration (Hours)

3

Additional Information for ATs

Continuous Assessment (%): 30%

Examination (%): 70%

Minimum Passing Requirement: A minimum of 30% in continuous assessment as well as in examination, in addition to a minimum of 40% in continuous assessment and examination taken together.

Assessment Rubrics (AR)

Assessment Task

1.Quiz

Criterion

Quiz score will be used to verify the state of students' learning progress

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

2.Lab report

Criterion

Practical report is based on specific knowledge and demonstrate subject-specific skills in discerning experimental work and data analysis

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

3.Oral presentation

Criterion

the quality of your oral presentation and discussion

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Assessment Task

4.End-of-term examination

Criterion

To test students' understanding and application of material taught in class and evaluate their performance based on their performance on the exam

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

- Biology and technology of tissue repair and organ regeneration
- Key molecules and cells in regeneration: techniques and analysis
- Emerging technologies of molecular and stem cell therapies, tissue engineering and novel biomaterials

- regeneration and aging society
- Medical and ethical implications of regenerative medicine

Reading List

Compulsory Readings

	Title
1	Engineering Biomaterials for Regenerative Medicine: Novel technologies for Clinical Applications, editor: Sujata Bhatia, to be published by Springer in Nov 2011, ISBN- 10:1461410797
2	Regenerative Biology and Medicine, David L. Stocum, published by Elsevier (online access from CityU Library)
3	Principles of Regenerative Medicine, Bruce Carlson, published by Elsevier

Additional Readings

	Title
1	Nil