

# BMS8106: STEM CELL AND REGENERATIVE MEDICINE

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## Effective Term

Semester B 2024/25

## Part I Course Overview

### Course Title

Stem Cell and Regenerative Medicine

### Subject Code

BMS - Biomedical Sciences

### Course Number

8106

### Academic Unit

Biomedical Sciences (BMS)

### College/School

College of Biomedicine (BD)

### Course Duration

One Semester

### Credit Units

3

### Level

R8 - Research Degree

### Medium of Instruction

English

### Medium of Assessment

English

### Prerequisites

Nil

### Precursors

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

Stem cells are undifferentiated biological cells that can have the potential to differentiate into cells that are found throughout the body. This fundamental property of stem cells suggests that they can potentially be used to replace degenerative cells within the body, and regenerate the functional capacity of organ systems that have deteriorated because of disease or aging. Thus this course provides an overview of the latest advances in the field of stem cell biology and regenerative medicine including but not limited to fundamental scientific knowledge and technological concepts of stem cells and stem cell based tissue regeneration. 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 examples to highlight conserved principles governing tissue repair and regeneration. The student will integrate their prior knowledge of cell and molecular biology, tissue engineering and genetics, to analyse the regulation of processes leading to tissue repair and regeneration.

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1 Distinguish the different patterns of tissue repair and organ regeneration in humans		x		
2 Discover key molecular players and modulating factors in the biology of repair, regeneration and replacement			x	
3 Compare and contrast the operational principles of molecular therapy, stem cell therapy, biologically-inspired materials and novel biomaterials			x	
4 Comprehend and evaluate current literature on biological functionality and compatibility, and applications of micro and nanotechnology of these emerging technologies			x	
5 Appraise the various approaches in manipulating the regeneration process in humans		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.

### Learning and Teaching Activities (LTAs)

LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1 Lecture	To learn through teaching.	1, 2, 3, 4, 5	39 hours in total

2	Tutorial (group project/ presentations)	To discuss new research papers and methodologies of the field.	1, 2, 3, 4, 5	39 hours in total
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**Assessment Tasks / Activities (ATs)**

ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Group project/ presentation, etc.	1, 2, 3, 4, 5	20
2	Assay writing	1, 2, 3, 4, 5	40
3	Presentation	1, 2, 3, 4, 5	40

**Continuous Assessment (%)**

100

**Examination (%)**

0

**Minimum Continuous Assessment Passing Requirement (%)**

0

**Minimum Examination Passing Requirement (%)**

0

**Assessment Rubrics (AR)****Assessment Task**

Jour club presentation, assay writing, and project presentation (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

**Criterion**

Ability to show the learning progress, analyse and express the synthesis of ideas and knowledge

**Excellent**

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

**Good**

(B+, B, B-) Substantial performance on all CILOs. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

**Fair**

(C+, C, C-) Satisfactory performance on the majority of CILOs possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

**Marginal**

(D) Barely satisfactory performance on a number of CILOs. Sufficient familiarity with the subject matter to enable the student to progress without repeating the course.

**Failure**

(F) Unsatisfactory performance on a number of CILOs. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature

**Assessment Task**

Jour club presentation, essay writing, and project presentation (for students admitted from Semester A 2022/23 to Summer Term 2024)

**Criterion**

Ability to show the learning progress, analyse and express the synthesis of ideas and knowledge

**Excellent**

(A+, A, A-) Outstanding performance on all CILOs. Strong evidence of original thinking; good organization, capacity to analyse and synthesize; superior grasp of subject matter; evidence of extensive knowledge base.

**Good**

(B+, B) Substantial performance on all CILOs. Evidence of grasp of subject, some evidence of critical capacity and analytic ability; reasonable understanding of issues; evidence of familiarity with literature.

**Marginal**

(B-, C+, C) Satisfactory performance on the majority of CILOs possibly with a few weaknesses. Being able to profit from the course experience; understanding of the subject; ability to develop solutions to simple problems in the material.

**Failure**

(F) Unsatisfactory performance on a number of CILOs. Failure to meet specified assessment requirements, little evidence of familiarity with the subject matter; weakness in critical and analytic skills; limited or irrelevant use of literature

**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	Nil

**Additional 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	Principles of Regenerative Medicine, Bruce Carlson, published by Elsevier