BMS8113: ADVANCED BIOMEDICAL MATERIALS AND DEVICES

Effective Term
Semester A 2025/26

Part I Course Overview

Course Title
Advanced Biomedical Materials and Devices

Subject Code
BMS - Biomedical Sciences
Course Number
8113

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

Additional Information
NIL

Part II Course Details

Abstract

The course aims to facilitate students with different educational backgrounds to gain advanced knowledge and innovative methods and techniques for biomaterials and corresponding fabrication technologies, wearable and implantable devices, and their applications in therapeutic treatment, personal health monitoring and disease management. The lecture content covers knowledge about material and engineering technologies for biomedical materials, wearable and implantable devices, sensing and feedback technologies, biocompatibility and physiology assessment of various biomedical materials and devices. Students will deliver a presentation and submit a written essay with specific topics that are closely related to the lecture content.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Recognize the significance of biomaterials and medical devices for therapeutic treatment, personal health monitoring and disease management.	20		x	x
2	Recognize the functions and principles of various materials and technologies that are used in biomedical devices.	30	x	x	x
3	Explain and demonstrate the ability to evaluate the outcomes and concerns of using wearable and implantable devices for therapeutic treatment.	30	x	x	x
4	Describe the concepts of tissue engineering, cell therapy, wearable healthcare technology and justify and apply them in research projects.	20	x	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.

Learning and Teaching Activities (LTAs)

	LTAs	Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will engage in formal lectures to gain various principles, applications and methodologies of biomaterials, and corresponding fabrication technologies, wearable and implantable devices, as well as the implementation of biomaterial scaffold and medical devices for therapeutic treatment, personal health monitoring and disease management.	1, 2, 3, 4	
2	Tutorial and group discussions	Students will give an oral presentation on a certain topic in biomedical materials and devices. They will actively engage as audience members during peers' presentations to stimulate thoughts and views.	3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Oral presentation	1, 2, 3, 4	50	There will be an attendance check in Q&A	Yes
2	Examination	1, 2, 3, 4	50	essay writing (take home)	Yes

Continuous Assessment (%)

100

Examination (%)

0

Minimum Continuous Assessment Passing Requirement (%)

0

Minimum Examination Passing Requirement (%)

0

Additional Information for ATs

Examination (Take home): essay writing; Similarity report will be requested to detect plagiarism and ensure academic integrity. Detailed requirements will be announced in class and will be posted on Canvas in due course.

Assessment Rubrics (AR)

Assessment Task

Oral Presentation

Criterion

Ability to analyse and criticise the implementation of biomedical materials and devices

Excellent

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

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

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

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

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

Examination

Criterion

Ability to analyse, state and apply the principles and subject matter learnt in the course

Excellent

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

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.

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Part III Other Information

Keyword Syllabus

- Biomimetics
- Biomaterials
- Hydrogels
- Biomarkers
- Cell scaffolds
- Cell therapy
- Stem cell
- Protein engineering
- Nucleic acid engineering
- Tissue engineering
- 3D bioprinting
- Micro/nanofluidics
- Medical devices
- Flexible electronics
- Wearable healthcare devices
- Advanced sensing technology

Reading List

Additional Readings

	Title
1	Biomaterials Science: An Introduction to Materials in Medicine 4th Edition