BME5110: BIOMEDICAL ENGINEERING DESIGN

Effective Term
Semester B 2025/26

Part I Course Overview

Course Title
Biomedical Engineering Design

Subject Code
BME - Biomedical Engineering
Course Number
5110

Academic Unit
Biomedical Engineering (BME)

College/School
College of Biomedicine (BD)

Course Duration
One Semester

Credit Units
3

Level
P5, P6 - Postgraduate Degree

Medium of Instruction
English

Medium of Assessment
English

Prerequisites
Nil

Precursors
Nil

Equivalent Courses
MBE5110/BME8122 Biomedical Engineering Design

Exclusive Courses
Nil

Part II Course Details

Abstract
This course aims to present a broad overview of the field of biomedical engineering to the students who do not have background in life science. It will focus on the common themes of healthcare, including fundamental human physiology

and pathology, biomedical technology, biomedical imaging and molecular imaging, and medical device and medical technology management. Students will learn about basic physiology, biotechnology for disease diagnosis and therapy, and healthcare and wellness, with an emphasis on applying the knowledge to design, engineer and solve problems related to the healthcare industry.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Explain basic concepts and principles of biomedical technology and how it is related to human physiology.		x		
2	Analyse the basic working principles of systems in human body and its relationship with pathology and medical devices to address the healthcare related problems.			x	
3	Identify basic atomic/molecular biology that can be used as readout for disease monitoring using medical devices.			x	
4	Design healthcare and disease management schemes by applying the knowledge in - biomedical engineering and imaging for promoting, sustaining and advancing quality care and health care.		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	Explain key concepts related to biomedical engineering.	1, 2, 3, 4	2 hrs/week
2	Tutorial	Recap and expand the materials taught in lectures.	1, 2, 3, 4	1 hr/week
3	Group project	Provide opportunities for students to integrate the principles taught in lectures through case studies	2, 3, 4	

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks (e.g. Parameter for GenAI use)
1	Midterm Test	1, 2, 3	30	
2	Group Project	2, 3, 4	20	
3	Assignment	1, 2, 3	20	

Continuous Assessment (%)

70

Examination (%)

30

Examination Duration (Hours)

2

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for both coursework and examination should be obtained.

Assessment Rubrics (AR)

Assessment Task

Examination (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to analyse the human healthcare problems in details, from molecular to system level; and to apply the biomedical engineering approach to address common problems in the healthcare industry.

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

Midterm Test (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion

Ability to identify essential biomedical tools to guide disease diagnosis and therapy, and to explain the biomedical engineering principles behind.

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
Group Project (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to utilize the materials taught in lectures to analyse and develop customized biomedical management/solutions to healthcare problems.

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
Assignment (for students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter)

Criterion
Ability to apply the biomedical concepts precisely to study healthcare problems in details, and to identify the important concepts and theory of different biomedical engineering systems.

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
Examination (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to analyse the human healthcare problems in details, from molecular to system level; and to apply the biomedical engineering approach to address common problems in the healthcare industry.

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Midterm Test (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to identify essential biomedical tools to guide disease diagnosis and therapy, and to explain the biomedical engineering principles behind.

Excellent
(A+, A, A-) High

Good
(B+, B) Significant

Marginal
(B-, C+, C) Basic

Failure
(F) Not even reaching marginal levels

Assessment Task
Group Project (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion
Ability to utilize the materials taught in lectures to analyse and develop customized biomedical management/solutions to healthcare problems.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

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(B-, C+, C) Basic

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Assessment Task

Assignment (for students admitted from Semester A 2022/23 to Summer Term 2024)

Criterion

Ability to apply the biomedical concepts precisely to study healthcare problems in details, and to identify the important concepts and theory of different biomedical engineering systems.

Excellent

(A+, A, A-) High

Good

(B+, B) Significant

Marginal

(B-, C+, C) Basic

Failure

(F) Not even reaching marginal levels

Part III Other Information

Keyword Syllabus

Biomedical Engineering; Biological Systems; Biomaterials; Radiology; Biomedical Imaging; X-ray computed tomography; Ultrasound imaging; Magnetic resonance imaging; Positron emission tomography; Contrast agent and molecular imaging; Medical devices; Quality assurance; Medical device and medical technology management; Healthcare Industry

Reading List

Compulsory Readings

	Title
1	N.A.

Additional Readings

	Title
1	W. Mark Saltzman. Biomedical Engineering: Bridging Medicine and Technology. Part of Cambridge Texts in Biomedical Engineering. Publication Date: June 29, 2009. ISBN-10: 0521840996.
2	John Denis Enderle, Joseph D. Bronzino & Susan M. Blanchard, Introduction to Biomedical Engineering, Academic Press, 2005. (http://books.google.com/books?id=_yV3DqIU-tkC&dq=isbn:0122386620).

3	Jerrold T. Bushberg, J. Anthony Seibert, Edwin M. Leidholt, Jr. John M. Bonne, The Essential Physics of Medical Imaging, Lippincott. 2012. ISBN 978-0-7817-8057-5.