

# BME4105: BIOMEDICAL DEVICES FOR DIGITAL MEDICINE

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## Effective Term

Semester A 2025/26

## Part I Course Overview

### Course Title

Biomedical Devices for Digital Medicine

### Subject Code

BME - Biomedical Engineering

### Course Number

4105

### Academic Unit

Biomedical Engineering (BME)

### College/School

College of Biomedicine (BD)

### 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

Nil

### Equivalent Courses

Nil

### Exclusive Courses

Nil

## Part II Course Details

### Abstract

The aim of this course is to introduce the state-of-the-art knowledge of biomedical devices for digital medicine. Biomedical device is an emerging biomedical engineering field which applies materials science, engineering, and physical technologies. This course will provide students with fundamental understanding of basic principles underlying biomedical devices, and develop skills in the areas of wearable biosensors with health monitoring of physiological signals, advanced manufacturing (3D printing, microelectronics fabrication, and inkjet printing), energy harvesting from accessible power sources (light, chemical, mechanical, and thermal energy).

### Course Intended Learning Outcomes (CILOs)

CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the basic principles of biosensing technology and biomedical devices.	x	x	
2	Explain representative designs and fundamental concepts on biomedical devices.	x	x	
3	Identify advanced manufacturing process for biosensor and integrated system technologies.		x	x
4	Design a biosensor or analyze the collected information related health monitoring.		x	x
5	Apply a feasible and effective engineering approach to a problem of biomedical device, with the knowledge involved in all the above CILOs.	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 develop an understanding of biomedical devices.	1, 2, 3, 4	3 hours/week for 13 weeks
2	Tutorial and Mini-project Presentation	Students will engage in case studies and discussion related to the assignment. Students will discuss with peers about various highlighted topics on design of biomedical devices or data processing.	1, 2, 3, 4, 5	1 hour/week for 11 weeks and 2 hours/week for 2 weeks

### Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignment	1, 2, 3, 4	15	-	No
2	Mini-project Report (one per group)	1, 2, 3, 4, 5	15	-	No
3	Mini-project Presentation (one per group)	2, 3, 4, 5	20	-	No

**Continuous Assessment (%)**

50

**Examination (%)**

50

**Examination Duration (Hours)**

2

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

30

**Minimum Examination Passing Requirement (%)**

30

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

Assignment

**Criterion**

ABILITY to EXPLAIN and IDENTIFY the technologies related to biomedical devices in details.

**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**

Mini-project Report

**Criterion**

ABILITY to REPORT the principles, designs, and data processing related to biomedical devices

**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

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**Assessment Task**

Mini-project Presentation

**Criterion**

ABILITY to PRESENT the literature survey and EVALUATE the result of different approaches.

**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

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**Assessment Task**

Examination

**Criterion**

ABILITY to EXPLAIN the methodology and procedure related to biomedical devices

**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**

Wearable devices, digital medicine, flexible electronics, biosensors.

**Reading List****Compulsory Readings**

Title	
1	N.A.

**Additional Readings**

Title	
1	Chandra Mouli Pandey, Bansi Dhar Malhotra Biosensors: Fundamentals and Applications 2nd Edition, 2019 ISBN 978-3-11-063780-9
2	Raymond H. W. Lam, Weiqiang Chen Biomedical Devices: Materials, Design, and Manufacturing, 2019 ISBN 978-3-030-24236-7
3	Shabbir Syed-Abdul, Xinxin Zhu, Luis Fernandez-Luque Digital Health: Mobile and Wearable Devices for Participatory Health Applications, 2020 ISBN 978-0-12-820077-3
4	Edward Sazonov Wearable Sensors: Fundamentals, Implementation and Applications, 2020 ISBN 978-0-12-819246-7