BME8142: RAPID DIAGNOSTIC DEVICES FOR PERSONALIZED HEALTHCARE

Effective Term
Semester B 2025/26

Part I Course Overview

Course Title
Rapid Diagnostic Devices for Personalized Healthcare

Subject Code
BME - Biomedical Engineering
Course Number
8142

Academic Unit
Biomedical Engineering (BME)

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
BME6142 Rapid Diagnostic Devices for Personalized Healthcare

Exclusive Courses
Nil

Additional Information
Nil

Part II Course Details

Abstract

The aim of this course is to introduce the state-of-the-art knowledge of rapid diagnostic devices for personalized healthcare. Rapid diagnostic 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 rapid diagnostic devices, develop skills in the areas of biosensors with health monitoring of physiological signals, such as vital signs and molecular information in biofluids, and introduce machine learning to associate specific disease-related physiological information with health conditions for personalized healthcare.

Course Intended Learning Outcomes (CILOs)

	CILOs	Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Describe the basic principles rapid diagnostic devices covering molecular detection and vital sign monitoring		x	x	
2	Explain representative designs and fundamental concepts on rapid diagnostic devices.		x	x	
3	Identify multimodal biosensing with rapid diagnostic devices and integrated system technologies.			x	x
4	Analyse sensing information related to personalized health monitoring.			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, expand and consolidate key concepts related to the course materials.	1, 2, 3, 4	2 hrs/week for 11 weeks
2	Tutorial	Students will discuss (with the instructor and their peers) via case studies and the selected problems.	1, 2, 3, 4	1 hr/week for 11 weeks

3	Mini-project	Students will engage in formulating state-of-the-art technologies, related to rapid diagnostic devices or bio-data processing, into self-contained novel ideas. Students will then present their ideas, followed by discussion and debate with their peers in various technical aspects.	1, 2, 3, 4	3 hrs/week for 2 weeks

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3, 4	40	-	No
2	Mini-project presentation (one per group)	1, 2, 3, 4	60	-	No

Continuous Assessment (%)

100

Minimum Continuous Assessment Passing Requirement (%)

30

Assessment Rubrics (AR)

Assessment Task

1. Assignments

Criterion

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

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Below marginal levels

Assessment Task

2. Mini-project presentation

Criterion

ABILITY to EXPLAIN the methodology and procedure related to rapid diagnostic devices

Excellent

(A+, A, A-) High

Good

(B+, B, B-) Significant

Fair

(C+, C, C-) Moderate

Marginal

(D) Basic

Failure

(F) Below marginal levels

Part III Other Information

Keyword Syllabus

healthcare, rapid diagnostic devices, 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