

BME6144: BIOCHIP DESIGN AND APPLICATIONS

Effective Term

Summer Term 2026

Part I Course Overview

Course Title

Biochip Design and Applications

Subject Code

BME - Biomedical Engineering

Course Number

6144

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

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course will provide students with background and basic knowledge of biochips and introduce some useful techniques. Biochips, with components as large as hundreds of microns, have potential uses ranging from the analysis of biomolecules to disease diagnosis, prevention and treatment. Students will have a basic understanding of the principles, current state and prospects of biochips, their fabrication and applications. The course will focus on major topics such as microfabrication technologies including both photolithography and soft lithography, surface engineering, microarrays and microfluidics, protein and DNA detection and analysis, lab-on-a-chip, rapid diagnostics and the frontiers in biochips.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if DEC-A1 app.)		DEC-A2	DEC-A3
1	Demonstrate a good understanding of standard microfabrication techniques.			x	
2	Apply microchips for biomedical applications such as rapid diagnostics.			x	x
3	Explain the categories, components, and working principles of biochips.			x	
4	Explain the interactions between biomolecules and cells with microdevices.			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 their understanding on biochip design and applications.	1, 2, 3, 4	2 hrs/ week
2	Tutorial	Students will discuss selected problems through case studies. Students will engage in answering, with guidance, the selected 'problem-solving' questions.	1, 2, 3, 4	1 hr/week

Assessment Tasks / Activities (ATs)

	ATs	CILO No.	Weighting (%)	Remarks ("- " for nil entry)	Allow Use of GenAI?
1	Assignments	1, 2, 3, 4	25	Project presentation	No
2	Test	1, 2, 3	25	-	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**

Assignments

Criterion

Ability to understand the design principles of microchips and their biomedical applications.

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

Test

Criterion

Ability to solve questions related to microchip design and fabrication.

Ability to understand the microfabrication procedure and all the steps involved.

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

Criterion

Good understanding of biochip design and fabrication, and ability to design microchips for specific biomedical applications and solve related 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

Part III Other Information

Keyword Syllabus

BioMEMS, microfabrication, silicon, PDMS, UV lithography, soft lithography, nanoimprinting, microarray, microfluidics, detection, analysis, bioassay, biosensor, lab-on-a-chip, rapid diagnostics

Reading List**Compulsory Readings**

Title	
1	N.A.

Additional Readings

Title	
1	Bio-MEMS: Technologies and Applications, 1st Edition, by Wanjun Wang (Editor), Steven A. Soper (Editor), CRC Press