

City University of Hong Kong
Course Syllabus

offered by
Department of Biomedical Engineering
with effect from Semester A 2024/25

Part I Course Overview

Course Title:	<u>Biomedical Engineering Design</u>
Course Code:	<u>BME5110</u>
Course Duration:	<u>1 semester</u>
Credit Units:	<u>3 credits</u>
Level:	<u>P5</u>
Medium of Instruction:	<u>English</u>
Medium of Assessment:	<u>English</u>
Prerequisites: <i>(Course Code and Title)</i>	<u>Nil</u>
Precursors: <i>(Course Code and Title)</i>	<u>Nil</u>
Equivalent Courses: <i>(Course Code and Title)</i>	<u>MBE5110/BME8122 Biomedical Engineering Design</u>
Exclusive Courses: <i>(Course Code and Title)</i>	<u>Nil</u>

Part II Course Details

1. 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.

2. Course Intended Learning Outcomes (CILOs)

(CILOs state what the student is expected to be able to do at the end of the course according to a given standard of performance.)

No.	CILOs	Weighting (if applicable)	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
			A1	A2	A3
1.	Explain basic concepts and principles of biomedical technology and how it is related to human physiology.		✓		
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.			✓	
3.	Identify basic atomic/molecular biology that can be used as readout for disease monitoring using medical devices.			✓	
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.		✓		✓
		N.A.			

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.

3. Learning and Teaching Activities (LTAs)

(LTAs designed to facilitate students' achievement of the CILOs.)

LTA	Brief Description	CILO No.				Hours/week (if applicable)
		1	2	3	4	
Lecture	Explain key concepts related to biomedical engineering.	✓	✓	✓	✓	2 hrs/week
Tutorial	Recap and expand the materials taught in lectures.	✓	✓	✓	✓	1 hr/week
Group project	Provide opportunities for students to integrate the principles taught in lectures through case studies		✓	✓	✓	

4. Assessment Tasks/Activities (ATs)

(ATs are designed to assess how well the students achieve the CILOs.)

Assessment Tasks/Activities	CILO No.				Weighting	Remarks
	1	2	3	4		
Continuous Assessment: 70%						
Midterm Test	✓	✓	✓		30%	
Group Project		✓	✓	✓	20%	
Assignment	✓	✓	✓		20%	
Examination: 30%						
Examination		✓	✓		30%	Duration: 2 hours
					100%	

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

5. Assessment Rubrics

(Grading of student achievements is based on student performance in assessment tasks/activities with the following rubrics.)

Applicable to students admitted before Semester A 2022/23 and in Semester A 2024/25 & thereafter

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Examination	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.	High	Significant	Moderate	Basic	Not even reaching marginal levels
2. Midterm Test	Ability to identify essential biomedical tools to guide disease diagnosis and therapy, and to explain the biomedical engineering principles behind.	High	Significant	Moderate	Basic	Not even reaching marginal levels
3. Group Project	Ability to utilize the materials taught in lectures to analyse and develop customized biomedical management/solutions to healthcare problems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
4. Assignment	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.	High	Significant	Moderate	Basic	Not even reaching marginal levels

Applicable to students admitted from Semester A 2022/23 to Summer Term 2024

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B)	Marginal (B-, C+, C)	Failure (F)
1. Examination	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.	High	Significant	Basic	Not even reaching marginal levels
2. Midterm Test	Ability to identify essential biomedical tools to guide disease diagnosis and therapy, and to explain the biomedical engineering principles behind.	High	Significant	Basic	Not even reaching marginal levels
3. Group Project	Ability to utilize the materials taught in lectures to analyse and develop customized biomedical management/solutions to healthcare problems.	High	Significant	Basic	Not even reaching marginal levels
4. Assignment	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.	High	Significant	Basic	Not even reaching marginal levels

Part III Other Information (more details can be provided separately in the teaching plan)

1. Keyword Syllabus

(An indication of the key topics of the course.)

- 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

2. Reading List

2.1 Compulsory Readings

(Compulsory readings can include books, book chapters, or journal/magazine articles. There are also collections of e-books, e-journals available from the CityU Library.)

2.2 Additional Readings

(Additional references for students to learn to expand their knowledge about the subject.)

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.