City University of Hong Kong
Course Syllabus

offered by
Department of Biomedical Engineering
with effect from Semester A 2022/23

Part I Course Overview

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

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 self-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. Teaching and Learning Activities (TLAs)

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

TLA	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 in Semester A 2022/23 and thereafter

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

Applicable to students admitted before Semester A 2022/23

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

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.