City University of Hong Kong
Course Syllabus

offered by Department of Physics and Materials Science
with effect from Semester A 2016 / 17

Part I Course Overview

Course Title:	**Biomaterials**
Course Code:	**AP3130**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**B3**
Proposed Area: *(for GE courses only)*	☐ Arts and Humanities ☐ Study of Societies, Social and Business Organisations ☐ Science and Technology
Medium of Instruction:	**English**
Medium of Assessment:	**English**
Prerequisites: *(Course Code and Title)*	**Nil**
Precursors: *(Course Code and Title)*	**AP2102 Introduction to Materials Engineering**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**AP4173 Biomedical Materials : From Engineering To Clinical Applications**

Part II Course Details

1. Abstract

Developing materials for use in biomedical field is a challenging interdisciplinary process and requires an understanding of material bulk and surface properties, the various biological responses to the materials, the clinical context of their use, manufacturing processes, cost, sterilization, packaging and regulatory issues. This course is designed to introduce students to the various classes of biomaterials in use and their applications in selected areas of the biomedical field.

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.	**Describe** the various classes of biomaterials on the basis of structure and function	25%		√	
2.	**Apply** various analytical methods to characterize bulk and surface properties of biomaterials	25%	√		
3.	**Understand** and the working principles and applications of various types of biomedical materials	25%		√	
4.	**Describe** various practical aspects of biomedical device design, fabrication and testing	25%		√	
		100%			

** If weighting is assigned to CILOs, they should add up to 100%.*

[#] Please specify the alignment of CILOs to the Gateway Education Programme Intended Learning outcomes (PILOs) in Section A of Annex.

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, theories, and applications etc.	√	√	√	√			2 hrs
Tutorial	Exercise practice	√	√	√	√			0.5 hr
Lab	The students will carry out lab work	√	√	√	√			0.5 hr

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: 35%								
Mid-term Test	√	√	√	√			20%	
Lab Experiment Project & Report	√	√	√	√			15%	
Examination^: 65% (duration: 2 hours)								
** The weightings should add up to 100%.*							100%	

^ For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

5. Assessment Rubrics

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

Assessment Task	Criterion	Excellent (A+, A, A-)	Good (B+, B, B-)	Adequate (C+, C, C-)	Marginal (D)	Failure (F)
Midterms	Understand the scientific principles and the working mechanisms. Identify and explain how the principles are applied to science and technology for solving physics and engineering problems.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Lab reports	Understand the experimental principles and evidence of original thinking, Ability to communicate ideas via written texts.	High	Significant	Moderate	Basic	Not even reaching marginal levels
Exam	Demonstrate understanding of the scientific principles and the working mechanisms. Identify and explain how the principles are applied to science and technology for solving physics and engineering problems.	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

Introduction of biomaterials; properties of polymeric materials, ceramics, and metal materials for biomedical applications; surface properties and characterization of biomaterials; biomaterial qualities: strength, wear, and sterilization; biological response to foreign materials, biocompatibility; degradable materials; biomedical devices, failure, retrieval & evaluation; applications in nephrology, ophthalmology, orthopaedics, and dentistry

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.	Joon Park and R. S. Lakes, "Biomaterials: An Introduction", Springer, 3rd edition, 2007, ISBN: 978-0387378794
2.	Joon B. Park and Joseph D. Bronzino, "Biomaterials: Principles and Applications", CRC Press, 1st Edition, 2002, ISBN: 978-0849314919