City University of Hong Kong
Course Syllabus

offered by Department of Physics
with effect from Semester B 2018/19

Part I Course Overview

Course Title:	**Advanced Physics for Biologists**
Course Code:	**PHY2400**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**B2**
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)*	**AP1400/PHY1400 Introductory Physics for Biologists**
Precursors: *(Course Code and Title)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**AP2400 Advanced Physics for Biologists**
Exclusive Courses: *(Course Code and Title)*	**Nil**

Part II Course Details

1. Abstract

(A 150-word description about the course)

This course covers a range of topics in physics relevant to medical and veterinary programs including electricity, magnetism and atomic physics in both physiological and pathological contexts. Students will investigate the fundamentals of these topics and become able to apply them to achieve understanding of aspects of neurotransmission, radiation and electrical pathologies and imaging technologies. This course equips students with a broad knowledge in several important topics in biophysics and the depth and coverage are sufficient for the students to pursue later studies in physiology, imaging technologies, and pathology.

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.	Recognize and use appropriately important technical terms and definitions relevant to the major topics in the course.	-	√		
2.	Use appropriate mathematical notation such as vector to formulate and apply the physical laws covered in the course in concise form.	-	√		
3.	Apply physics laws of electricity, magnetism and atomic physics in medical and veterinary situations.	-	√	√	
4.	Solve real and hypothetical problems by identifying the underlying physics and analyzing the problem.	-	√	√	√
** If weighting is assigned to CILOs, they should add up to 100%.*		-			

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 and theory of topics of the course	√	√	√				2 hrs/wk
Tutorial	Explain how some problems are solved and the techniques used explain some concepts	√	√	√	√			1 hr/wk
Assignments	Require students to solve real and hypothetical problems	✓	✓	✓	✓			2hrs/wk

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: 40%								
Homework Assignments	√	√	√	√			30%	
Quizzes	√	√	√	√			10%	
Examination^: 60% (duration: 2 hours)								
	√	√	√	√			60%	
** 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-)	Fair (C+, C, C-)	Marginal (D)	Failure (F)
1. Homework Assignments	1. Capacity for using physics knowledge and theory to solve biomedical problems 2. Demonstrate correct understanding of key concepts	Will exhibit a high level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit a good level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit a basic level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit some deficiencies in understanding, explaining, and integrating the knowledge in written format	Will exhibit lack of competence in understanding, explaining, and integrating the knowledge in written format
2. Quizzes	1. Capacity for using physics knowledge and theory to solve biomedical problems 2. Demonstrate correct understanding of key concepts	Will exhibit a high level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit a good level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit a basic level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit some deficiencies in understanding, explaining, and integrating the knowledge in written format	Will exhibit lack of competence in understanding, explaining, and integrating the knowledge in written format
3. Examination	1. Capacity for using physics knowledge and theory to solve biomedical problems 2. Demonstrate correct understanding of key concepts and physics theory	Will exhibit a high level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit a good level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit a basic level of competence in understanding, explaining, and integrating the knowledge in written format	Will exhibit some deficiencies in understanding, explaining, and integrating the knowledge in written format	Will exhibit lack of competence in understanding, explaining, and integrating the knowledge in written format

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.)

Electrical properties: Polarity. Conduction of electricity in solids and liquids. Resistance and resistivity. Transfer of electrical energy.

Electric fields: Coulomb's law. Field lines. Electric potential. Capacitors. Lightning.

Magnetism: Field due to magnets and currents. Definition of B. Force on a wire carrying a current in a uniform magnetic field. Electromagnetic induction. Faraday's law. Lenz's law. Electromagnetic waves.

Physics of fluid: density, pressure and buoyancy. Blood pressure.

Modern physics: Photoelectric effects. Photons. Theories of the atom. Matter wave. Wave-particle duality. Basics of quantum mechanics. Atomic structure. Periodic table.

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.)

N/A

2.2 Additional Readings

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

1.	Young,H. and Freedman, R. (2015) "University Physics with Modern Physics" 14th Edition. Pearson, San Francisco.
2.	Bushberg, J.T., Siebert, J.A., Leidholdt, E.M. and Boone, J.M. (2012). The essentials of medical imaging, 3rd edition. Wolters Kluwer, Philadelphia
3.	Halliday, D., Resnick, R., and Walker, J. (2005). "Fundamentals of Physics" 9th Edition, Wiley