Hong Kong Baptist University
Faculty of Science – Department of Physics

Title (Units): PHYS1006 INTRODUCTION TO PHYSICS (3,3,1)

Course Aims: This course provides a modern perspective to physics that focuses on its role in generating fundamental understanding of natural phenomena as well as innovation of new technologies. It also emphasizes the exercise and development of skills of quantitative reasoning and analysis in the context of daily life experience.

Pre-requisite: None

Course Reviewed by: Dr. Liang Tian and Prof. Lei-Han Tang

Course Intended Learning Outcomes (CILOs):

No.	Upon successful completion of this course, students should be able to:
1	Describe the scientific process to arrive at fundamental laws of nature;
2	Describe the basic constituents of nature and characteristics of forces between them;
3	Explain how the discovery and accumulation of fundamental physical laws led to quantitative theories of observed phenomena, e.g., the spectra properties of an atom;
4	Use key concepts of physics such as energy conservation and rules governing transformation between different forms of energy to analyze phenomena in daily life;
5	**Practical skills**: Solve simple problems at the level of introductory physics;
6	**Aptness:** Appreciate the intrinsic beauty and quantitative nature of physical laws.

Teaching & Learning Activities (TLAs)

CILOs	TLAs will include the following:
1-6	Through course lectures, students will learn the nature and content of fundamental physical principles, such as Newtonian laws, laws of thermodynamics and electromagnetism, and how to use them to solve simple problems.
1-6	Through in-class discussions guided by the instructor, students will learn how to analyze a physical problem following quantitative reasoning.
1, 2, 5, 6	Through homework and in-class demonstration of examples, students will learn how to use mathematical tools and equations to derive quantitative solutions to simple physical problems.
1-3, 5, 6	By doing individual and/or group projects, students will use principles and laws of physics to explore real-life phenomena and problems.

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Assessment Methods (AMs):

Type of Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
Continuous Assessment (assignments, midterm examination)	50-60%	1-6	Continuous assessments are designed to measure students' understanding of introductory physics.
Final Examination	40-50%	1-6	Final Examination is designed to test how far students have achieved their intended learning outcomes.

Learning Outcomes and Weighting:

Content	LO No.	Teaching (in hours)
I. Basic concepts	1-6	14
II. Real life phenomena (examples)	1-6	16
III. Contemporary issues (examples)	1-6	6

Textbook: Decided by the instructor.

References:

1. C.H. Holbrow, J.N. Lloyd, J.C. Amato, E. Galvez, and M.E. Parks, Modern Introductory Physics, Springer Science & Business Media, 2010.
2. R.A. Muller, Physics and Technology for Future Presidents: An Introduction to the Essential Physics Every World Leader Needs to Know, Princeton, 2010.
3. L. Bloomfield, How Everything Works, Wiley, 2007.
4. K.F. Kuhn, Basic Physics: A Self-Teaching Guide, 2nd Ed., Wiley, 1996.
5. J. Touger, Introductory Physics: Building Understanding, Wiley, 2006.
6. R. Oman and D. Oman, How to Solve Physics Problems, McGraw-Hill, 1997.

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Course Content in Outline:

	Topic	**Hours**
I.	Basic concepts	14*
	A. The physicist's approach (the scientific method, quantitative reasoning, falsifiability)	
	B. Mechanics (kinematics, dynamics, Newton's laws, energy and conservation)	
	C. Oscillations and waves (simple harmonic motion, wave motion, interference)	
	D. Thermodynamics (heat, temperature, laws of thermodynamics)	
	E. Electricity and magnetism (charges and fields, electromagnetic waves)	
II.	Real life phenomena (examples)	16
	A. Planet Earth (such as planetary motion, geographic landscape, weather patterns, oceanography)	
	B. Natural phenomena (such as typhoons, earthquakes, tsunamis, colors of the sky, lightning, aurora)	
	C. What is matter? (from atoms up, from nucleus down, forces of nature)	
	D. Evolution of the universe (Earth's age, Universe's age, the solar system, the cosmos)	
III.	Contemporary issues (examples)	9
	A. Energy and Sustainable development (climate change, man's impact on Nature, energy in our daily life, green technology, etc)	
	B. New discoveries (new physics and technological development that might change our world and our life)	

*The 14 hours on basic concepts may be distributed throughout the course in order to explain the phenomena and to address the issues outlined under topics II and III.