City University of Hong Kong
Course Syllabus

offered by Department of Physics
with effect from Semester A 2020/2021

Part I Course Overview

Course Title:	**Everyday Physics**
Course Code:	**GE1305**
Course Duration:	**One semester**
Credit Units:	**3**
Level:	**A1, B1**
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)*	**Nil**
Equivalent Courses: *(Course Code and Title)*	**Nil**
Exclusive Courses: *(Course Code and Title)*	**AP1200/PHY1200 Foundation Physics**

Part II Course Details

1. Abstract

Technology has become a very important part of our life and career and our graduates will face various choices in the use of technology and technology related decisions in their future career. In this course, a non-mathematical approach is used to teach students physics concepts and principles, which are of general relevance and enable the students to develop well-informed opinions and choices in their professional career and everyday life. Students are also expected to learn in the course thinking skills of a physicist, which are evidence-based, critical and based on the framework of physical principles. The course will be run in a combination of lectures and tutorials with examples drawn from our everyday experience, important technologies, news, or even product marketing materials. Typical examples are experience in MTR, utilities in kitchens, mobile phones, musical instruments, renewable energy sources, LCD and OLED displays. The students is assessed through an examination with conceptual questions (there will be no numerical questions). The students can practice the use of concepts and principles to analyse a phenomenon or technology in tutorials. These tutorial questions are good training of the analytical skills used by physicists. Students, who have little high school background but will take PHY1101 "Introductory Classical Mechanics", PHY1201 "General Physics I" or PHY1400 "Introductory Physics for Biologists", should take this course with the additional tutorials as preparation for PHY1101, PHY1201 and PHY1400. In the extra tutorials, the necessary mathematical formulation and examples of numerical problems are taught to prepare the students for PHY1101, PHY1201 and PHY1400.

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.	Cite and describe the basic principles of physics and concepts.		✓		
2.	Identify and explain scientific information or principles in relevant daily experience and public issues, technologies or relevant business/industrial operations.		✓	✓	
3.	Discuss relevant daily experience and public issues, technologies or relevant business/industrial operations using the pertinent language and scientific reasoning of a physicist.				✓
** If weighting is assigned to CILOs, they should add up to 100%.*		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	
Lectures	Describe and explain the examples, concepts and principles of physics	✓	✓		26 hours in total
Video viewing	Students will watch video programmes on physics experiments or documentaries on daily experience, technology, social issues / policies which prompt them to search scientific interpretations and explanation of the phenomena or issues.	✓	✓		varies, during the lectures or tutorials
Discussion sessions	Students form groups and discuss on topics/phenomena from everyday experience, social issues and relevant technologies. The discussion trains scientific interpretation of information using physics concepts and principles. Students are encouraged to discuss and argue among themselves before finalizing the answers. Students can raise questions and tutors can either provide answer or lead group discussion. In the discussion sessions, the students are required to answer some questions.			✓	There is a total of five discussion sessions, around 4 hours in total.

During the lectures and tutorials, the following topics can be used to raise the interest of the students and lead the student to the relevant physics concepts and principles. These examples can also train the students to apply the concepts and principles to analyse the phenomena and operation principles. This list of topics is not exhaustive and other topics will be included if necessary:

1. Relation between your mobile phone and your microwave oven and production of food.
2. Where does the energy we use come from?
3. Why do you need to hold the hand rails in MTR?
4. Friction actually helps us to move. Without friction can we walk?
5. How do microwave ovens cook?
6. What does happen in boiling water?
7. Why do we use dry ice instead of ice to keep your ice cream cold?
8. Relation between LCD TV and your ice tea.
9. What is the reason for buying a quantum dot TV? Is it really better?
10. Is OLED display really better than LCD display?
11. Why do grand pianos have the beautiful shape? What are the common components in a musical instrument?
12. Are the food radioactive after reheated in a microwave oven?
13. Why do we need nuclear power plant?
14. How does radiotherapy cure cancer?
15. Quantum physics we use everyday.
16. Strange quantum world: a particle is not 100% a particle?
17. How can we create weightlessness on earth?
18. How is the laser show effect created? Its relation to internet communication.
19. How do LED light bulbs work and how do they save energy?

Possible video for viewing during class:

1. **"**Slow Motion Musical Instruments | Mister C (Slow Mo #14)" Youtube
2. "Energy for the future: the grand vision" (TJ163.2 .E547 2001 DVD)
3. "Renewable Energy" (TJ808 .R4723 2008 DVD)
4. "Law of Conservation of Energy (Roller Coaster Demo)" Youtube
5. "Electromagnetic Waves**"** Youtube
6. "Laser : the extraordinary light for material processing" (TA1677 .L3747 2000 DVD)
7. "Light Fantastic" (QC363 .L54 2007 DVD)
8. "Classic sound waves films" (QC225 .C537 2006 DVD)
9. "Hiroshima" (D767.25.H6 H568 2006 DVD)
10. Other videos which can help students to understand the topics above and concepts in the course outline.

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		
Continuous Assessment: 30 %					
Assignments	✓	✓	✓	30%	
Examination^: 70% (duration: 2 hours)					
Examination	✓	✓	✓	70%	
** 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.

The Assignment will be completed in Canvas and consists of multiple choice questions or short answer questions. The main purpose of the assignment is to train students. They are allowed to have several attempts in answering the questions.

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. Examination	Demonstrate ability to understand the physics concepts and principles and use these information to understand examples discussed in lectures. Use the physics concepts and principles to explain physical phenomena or technology which are not discussed in details in lectures or tutorials to explain phenomena.	High	significant	moderate	basic	Not reaching marginal level
2. Assignment	Demonstrate understanding of physics concepts and principles and their application.	High	significant	moderate	basic	Not reaching marginal level

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

1. Keyword Syllabus

1. Newton's Law of motion: Velocity, Acceleration, Force,
2. Energy and Power: Work done, Forms of Energy, Conservation of Energy, Electric Car, Diet or Exercise, Renewable energy
3. Atoms and Heat: Building blocks of matter, Different Phases of Matter, Temperature and Thermal effects, Heat Engines and Refrigerators, Air Pressure
4. Gravity and Space: Gravitational force Launching rockets and Satellite, Solar system
5. Nuclei and Radioactivity: Radioactivity, Seeing radiation, Radiation and death, Radiation to cure cancer, Environmental radioactivity, Fission, Fusion.
6. Chain Reactions, Nuclear Reactors and Atomic Bombs: Various types of chain reactions, e.g. computer viruses, lightning and avalanches; Making a nuclear bomb, Nuclear Reactors and Daya Bay Nuclear Power Plant, Controlled fusion for power.
7. Electricity and Magnetism: Charge and current, Finger sparks and lightning, magnets and compass, permanent magnets and electromagnets, magnetic recording, electric motors and generators, transformers, magnetic levitation, AC vs. DC.
8. Waves: Sound waves, wave in a stretched string, water waves and tsunamis, earthquakes, music, superposition of waves, introduction to electromagnetic waves and quantum waves
9. Light: Light and colour, EM wave fiber optics, photography and images, mirages, rainbows, mirrors and lenses, polarized light and 3-D movies, LCD displays.
10. Invisible light: Light beyond the visible spectrum, Infrared and ultraviolet, night vision, remote sensing, weather satellites, sunburn and sunblock, the ozone layer and ozone depleting chemicals, other invisible 'light' including x-rays, gamma rays, radio waves and microwaves.
11. Quantum Physics: Particles are waves!', Minimum unit of energy, Laser and DVD, Photoelectric effect and digital camera, Semiconductor and computer chips, Electron microscope, 'Do you know your exact position?' – Uncertainty Principle.

2. Recommended Textbook

1. **Conceptual Physics** 12th Edition, P G Hewitt, Pearson.
2. **Conceptual Physical Science** 5th Edition, P G Hewitt, J A Suchocki, L A Hewitt, Pearson.
3. **College Physics** Paul Peter Urone, Roger Hinrichs, Kim Dirks, Manjula Sharma, Openstax College (for students who will take PHY1101, PHY1201 and PHY1400).

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.)

Nil

2.2 Additional Readings

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

1.	"Physics and Technology for Future Presidents – An Introduction to the Essential Physics Every World Leader Needs to Know", Richard A. Muller, Princeton University Press, 2010.

Annex
(for GE courses only)

A. Please specify the Gateway Education Programme Intended Learning Outcomes (PILOs) that the course is aligned to and relate them to the CILOs stated in Part II, Section 2 of this form:

GE PILO	Please indicate which CILO(s) is/are related to this PILO, if any *(can be more than one CILOs in each PILO)*
PILO 1: Demonstrate the capacity for self-directed learning	CILO 2 and CILO 3
PILO 2: Explain the basic methodologies and techniques of inquiry of the arts and humanities, social sciences, business, and science and technology	CILO 1
PILO 3: Demonstrate critical thinking skills	CILO 2 and CILO 3
PILO 4: Interpret information and numerical data	CILO 2 and CILO 3
PILO 5: Produce structured, well-organised and fluent text	
PILO 6: Demonstrate effective oral communication skills	
PILO 7: Demonstrate an ability to work effectively in a team	
PILO 8: Recognise important characteristics of their own culture(s) and at least one other culture, and their impact on global issues	
PILO 9: Value ethical and socially responsible actions	CILO 2
PILO 10: Demonstrate the attitude and/or ability to accomplish discovery and/or innovation	CILO 2 and CILO 3

GE course leaders should cover the mandatory PILOs for the GE area (Area 1: Arts and Humanities; Area 2: Study of Societies, Social and Business Organisations; Area 3: Science and Technology) for which they have classified their course; for quality assurance purposes, they are advised to carefully consider if it is beneficial to claim any coverage of additional PILOs. General advice would be to restrict PILOs to only the essential ones. (Please refer to the curricular mapping of GE programme: http://www.cityu.edu.hk/edge/ge/faculty/curricular_mapping.htm.)

B. Please select an assessment task for collecting evidence of student achievement for quality assurance purposes. Please retain at least one sample of student achievement across a period of three years.

Selected Assessment Task
Examination and marks distribution.