Items of Course Outlines

course code: PHYS **1001**

course title: Physics and the Modern Society

offering year/term: 2024-25 Spring

1. Instructor (s) – Name and Contact Details

Prof. LIN, Nian phnlin@ust.hk

2. Teaching Assistant (s) - Name and Contact Details

NG Ka Long Gary phklgng@ust.hk

Chen Henan hchendg@connect.ust.hk

3. Meeting Time and Venue – Lectures, Tutorials

Lectures: MoWe 12:00PM - 1:20PM Rm 4620,

Tutorials:

T1 We 4:30PM - 5:20PM Rm 6591

T2 We 6:00PM - 6:50PM Rm 5583

4. Course Description - Credit Points, Pre-requisite, Exclusion, Brief Information/synopsis

This course is for students with no physics background.

Exclusion: Level 3 or above in HKDSE 1/2x Physics or HKDSE 1x Physics; any PHYS courses at 1100-level or above.

No. of Credits: 3

Topics covered in this course: Principle of scientific theories and methods, Aristotle's law, Newtonian mechanics, thermal physics, heat engine, energy crisis, global warming, nature of waves, the physics of hearing and vision, electricity and magnetism, electromagnetic waves, telecommunication, relativity, quantum physics, nuclear energy, semiconductor, developments and outlook of contemporary physics.

5. Intended Learning Outcomes

Upon successful completion of this course, students are expected to be able to do the following:

- Describe the empirical, theoretical, and philosophical foundations of physics
- Show how the basic concepts of theoretical physics explain important experimental results
- Identify the contributions of physics to the technological innovations of modern society
- Apply the main ideas of physics to solve simple problems and make decisions
- Use scientific language to describe physical phenomena in everyday life
- Explain how an understanding of physics helps us make better decisions for the benefit of society, the economy, and the environment

6. Assessment Scheme

Assessment *(Percentage + assessment tasks)*	Assessing Course ILOs *(Respective course ILOs)*
MC in Lectures 20%	ILOs 2, 4

Ø Multiple-choice questions via iPRS. Students may discuss with each other.	
Tutorials 20% Ø Individual mode(10%) : Answer multiple-choice questions given by TA. Students may discuss with each other. Ø Group mode(3-5 people) : Each group set a MC question each time (10%). Other groups answer these question (5%).	ILOs 2, 3, 4
Video Presentations 30% Ø Students may opt individual mode or group mode (up to 3 people). Ø Choose an article given by instructor. Ø Present a 5-10 min video (upload online): summarizing the content of the article and commenting the article based on the knowledge learned in lectures (10%) Ø Raise questions/comments to others' videos. (10%) Ø Answer questions (5%)	**ILOs 1, 3, 4, 5 ,6**
Final Exam 30% Ø Multiple-choice questions (close book)	ILOs 1, 2, 4,

7. Student Learning Resources - Lecture Notes, Readings

   Lecture Notes, articles, video clips, demonstration experiments

8. Teaching and Learning Activities -
   a. Lectures: focus on observation, understanding, peer discussion
   b. Tutorials/Laboratory: focus on application of the learned knowledge, peer discussion.
9. Course Schedule

Lec. No. Date	Title	Topics	Demonstration
1 Feb.3	Introduction	Physics, scientific method	TD01_06 Cooled Balloon TD01_07 Banana Hammer OW01_01 Simple Pendulum ME02_01 Feather and Ball (Free fall)
2 Feb.5	Energy 1	Energy conservation and conversion, Solar energy	EN01_01 Power from Fuel ME06_01 Newton's cradle
3 Feb.10	Energy 2	Electricity generator	EM01_02 Van de Graaff Generator: Hair raising EM04_01 Conductivity of Ions EM04_05 Plasma Ball (Conduction in gas)

			EM07_01 Faraday's Law (Coil and Magnet) ME07_02 Hand-Crank Generator
4 Feb.12	Energy 3	Nuclear energy, Renewable Energy	EN02_02 Wind Power Generator Conductance of a semiconductor EN02-04 Solar/Fuel Cell Car
5 Feb.17	Information Technology 1	Wireless communication, optical fiber	EM06_01 Oersted's Law Apparatus EM09_02 Plasma Ball (Illuminate a fluorescent tube) OP01_07 Light transmission by total reflection (light guide) OP01_08 Optical Fiber water light guide
6 Feb.19	Information Technology 2	hard disk	EM06_10_02 Curie Temperature 2 (JAE alloy) EM06_02_03 Magnetic Field Patterns - Solenoid EM06_05 Electromagnet EM06_03 3D Magnetic Field Compass needles
7 Feb.24	Household devices 1	Microwave oven Electromagnetic stove	EM02_01 Electric Field Apparatus EM02_03 Electron beam Deflection EM07_03 Electromagnetic Launcher
8 Feb.26	Household devices 2	Refrigerator Air conditioner	TD03_01 Kinetic Theory Model TD03_02 Adiabatic Compression
9 Mar.3	Household devices 3	Electronic clock, GPS	OW01_03 Oscillating Spring OW03_04 Resonance Forks
10 Mar.5	Microscopy and Nanotechnology 1	Microscopy	OP03_02 Two / Multi Slits Interference OP03_06 Diffraction of an opaque point with laser
11 Mar.10	Microscopy and Nanotechnology 2	Nanotechnology	MP02_01 Emission Spectral Lines OW04_01 Standing Waves on Vibrating String

12 Mar.12	New Materials 1	Semiconductor, Superconductor	MP01_02 Meissner Effect (Superconductivity)
13 Mar.17	New Materials 2	Metamaterials, Graphene	
14 Mar.19	Entertainment 1	Lights, LED, Laser	EM09_02 Plasma Ball (Illuminate a fluorescent tube) EM06_06 Helmholtz Coils red, green and blue LEDs and lasers Light bulb
15 Mar.24	Entertainment 2	3D movies, LCD, OLED	Polarizer glasses OP06_02 Vision Panel
16 Mar.26	Entertainment 3	Sound, Music instrument	OW03_04 Resonance Forks
Mar.31 - Apr.4	Midterm Study Break		
17 Apr.7	Medical technology 1	ultrasonic imaging, Infrared sensors	Thermal couple
18 Apr.9	Medical technology 2	MRI, PET	Compasses, Magnet
19 Apr.14	Medical technology 3	X-ray imaging Radiation Therapy	MP03_01 Geiger Muller Count
20 Apr.16	Environmental issues 1	Nuclear pollution	
21 Apr.23	Environmental issues 2	Greenhouse effect	EN03_01 Green House Effect
22 Apr.28	Environmental issues 3	Earthquake	OW02_01 Slinky – Longitudinal and Transverse Wave
23 Apr.30	Future Technologies and Physics		
24 May.7	Term Review		

1 Jan.31	Introduction	Physics, scientific method	TD01_06 Shrinking Balloon TD01_07 Banana Hammer OW01_01 Simple Pendulum ME02_01 Feather and Ball (Free fall)
2 Feb.2	Energy 1	Energy conservation and conversion, Solar energy,	EN01_01 Power from Fuel ME06_01 Roller Coaster (Loop the loop)
3 Feb.7	Energy 2	Electricity generator	EM01_02 Van de Graaff Generator: Hair raising EM04_01 Conductivity of Ions EM04_05 Plasma Ball (Conduction in gas) EM07_01 Faraday's Law (Coil and Magnet) ME07_02 Hand-Crank Generator
Feb.9	CNY Break		
4 Feb.14	Energy 3	Nuclear energy, Renewable Energy	EN02_02 Wind Power Generator Conductance of a semiconductor EN02-04 Solar/Fuel Cell Car
5 Feb.16	Information Technology 1	Wireless communication, optical fiber	EM06_01 Oersted's Law Apparatus EM09_02 Plasma Ball (Illuminate a fluorescent tube) OP01_07 Light transmission by total reflection (light guide) OP01_08 Optical Fiber water light guide
6 Feb.21	Information Technology 2	hard disk	EM06_10_02 Curie Temperature 2 (JAE alloy) EM06_02_03 Magnetic Field Patterns - Solenoid EM06_05 Electromagnet EM06_03 3D Magnetic Field

			Compass needles
7 Feb.23	Household devices 1	Microwave oven Electromagnetic stove MEMS	OW04_01 Standing Waves on Vibrating String EM07_03 Electromagnetic Launcher
8 Feb.28	Household devices 2	Electronic clock, GPS	OW01_03 Oscillating Spring OW03_04 Resonance Forks
9 Mar.1	Household devices 3	Refrigerator Air conditioner	TD03_01 Kinetic Theory Model TD03_02 Adiabatic Compression
10 Mar.6	Microscopy and Nanotechnology 1	microscope	OP03_02 Two / Multi Slits Interference OP03_06 Diffraction of an opaque point with laser
11 Mar.8	Microscopy and Nanotechnology 2	Nanotechnology,	MP02_01 Emission Spectral Lines OW04_01 Standing Waves on Vibrating String
12 Mar.13	New Materials 1	Semiconductor, Superconductor	MP01_02 Meissner Effect (Superconductivity)
13 Mar.15	New Materials 2	Metamaterials, Graphene	
14 Mar.20	Entertainment 1	Lights, LED, Laser	EM09_02 Plasma Ball (Illuminate a fluorescent tube) EM06_06 Helmholtz Coils red, green and blue LEDs and lasers Light bulb

15 Mar.22	Entertainment 2	3D movies, LCD, OLED	Polarizer glasses OP06_02 Vision Panel
16 Mar.27	Entertainment 3	Sound	OW03_04 Resonance Forks
Mar.28 - Apr.5	Midterm Study Break		
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23 May.3	Future Technologies and Physics		
24 May.8	Term Review		