

Items of Course Outlines

PHYS2022 Fundamental Physics

Course Outline- Fall 2023

1. Instructor (s) –

Name: Nidhi Pant

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2. Teaching Assistant (s) -

IA: LAU Tsz Ming (lautm@ust.hk)

TA: KE Yanzhe (ykeah@connect.ust.hk)

TA: CHEN Hanyu (hchencr@connect.ust.hk)

3. Meeting Time and Venue –

Lectures:

Tuesday and Thursday (15:00 - 16:20)

Venue: CYTG010

Tutorials:

Tuesday (9:30 - 10:20)

Thursday (18:00 – 18:50)

Venue: Room 2306

4. Course Description

Credit Points: 3

Pre-requisite: PHYS 1114 OR PHYS 1154 (prior to 2014-15) OR PHYS 1314 OR PHYS

Exclusion: NIL

Brief Information/synopsis: This course deals with basic concepts of theories of relativity, basics of quantum theory, atomic physics and nuclear physics. Students will learn to apply the principles of modern physics to analyze and solve basic problems in modern physics.

5. Intended Learning Outcomes

(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.	ILOs
1	Introduction to relativity and reference frames
2	Students learn to apply Lorentz transformations, the space-time interval, relativistic energy, and relativistic momentum
3	Developing an understanding of the quantum picture of the Universe (e.g. Bohr atom, Heisenberg Uncertainty Principle, wave-particle duality, one-dimensional Schrödinger equation)
4	Development of atomic, molecular structure and nuclear models
5	Apply basic principles of modern physics to analyze and solve problems.

6. Assessment Scheme

- Examination duration: 2 hrs
- Percentage of coursework, examination, etc.:

<u>Assessment</u>	<u>Assessing Course ILOs</u>
25 % by weekly assignments	1, 2, 3, 4
35% by Midterm exam	1, 2, 3, 4
40% by Final exam	1, 2, 3, 4

- The grading is assigned based on students' performance in assessment tasks/activities.

7. Student Learning Resources

Recommended Reading:

Text(s):

- 1) A Beiser, Concepts of Modern Physics, McGraw-Hill (latest edition)
- 2) Kenneth Krane, Modern Physics, Wiley publications (Third edition)
- 3) Hugh D. Young and Roger A. Freedman, University Physics with Modern Physics, Addison-Wesley (13th Edition)

8. Teaching and Learning Activities -

Scheduled activities: 4 hrs (lecture + tutorial)

- a. Lectures: focus on learning the concepts of modern physics
- b. Tutorials: focus on application of the concepts learned in the lectures

9. Course Schedule

Special Relativity (8 lectures)	Introduction & Special Relativity: Relativity of Space and Time Special Relativity: Length, Simultaneity and Lorentz Transformation Special Relativity: Geometry, Energy and Momentum
General Relativity (2 lectures)	Concepts of general relativity Principle of equivalence, bending of space-time continuum, experimental evidence.
Cosmology (3 lectures)	Brief introduction to Cosmology
Quantum Mechanics (4 lectures)	Waves, Particles and Measurements

Quantum Mechanics (4 lectures)	Schrodinger Equation and Hydrogen atom
Atomic structure (3 lectures)	Model of atom and spectra
Statistical physics (1 lectures)	Maxwell, Bose and Fermi distributions