HiLCoE
School of Computer Science & Technology
WINTER 2025

General Physics (CC140)

Course Outline

Course Title: General Physics

Course Code: **CC140**
Course Credits: 4 Cr. Hrs.

Name of Instructor: **Alexander K**

Course Goal (Learning Outcomes)

By the end of this course the student will be able to:

- Develop knowledge and skills in basic measurement and uncertainty.

- Understand the basic concepts of physics and the relations between them (Laws).

- Describe and explain natural phenomena using the basic concepts and laws.

- Apply the basic concepts and laws to practical situations.

- Develop the algebraic skills needed to solve theoretical and practical problems.

- Appreciate the applicability of physics to a wide range of disciplines.

Course Description

This course provides science students with the basic concepts of physics that enable them to understand describe and explain natural phenomena. Emphasis is laid on general principles and fundamental concepts in measurements, mechanical and thermal interactions between systems, fluid mechanics, electromagnetism, oscillations and waves with applications in various fields of science. The course treatment is based on moderate use of mathematics.

The course covers topics from mechanics, thermal physics, oscillations and waves, electricity and magnetism and geometrical optics. The chapters on mechanics introduce the principles and laws governing the motion of objects and the interaction between them. The chapter on heat and

temperature discusses the interaction between systems through energy transfer and describes some basic thermal properties of such systems. The chapters on oscillations, waves and optics provide basic concepts of periodic motions, how waves these transfer energy from one place to the other, and use the concepts of light rays to explain image formation by mirrors and lenses.

Electromagnetism and electronics introduces the basic electric and magnetic phenomena using the concept of field and treats elementary concepts of semiconductors. Cross-cutting application of physics explain the roles of physics in Agriculture, Industries, Medicine, Archeology, Power generation, Earth and Space Sciences.

Grade Distribution

Assessments	Points
Midterm Exam	**30%**
Assignment &Project	**20%**
Final Exam	**50**
Total	**100%**

Students must attend above 80% of the lecture classes.

Chapter 1. Preliminaries (2hrs.)
Physical Quantities and Units of Measurement
Uncertainty in Measurement and Significant Digits
Vectors: Addition, Components, Magnitude and direction
Unit Vectors

Chapter 2. Kinematics and Dynamics of particles (13hrs.)
Kinematics in One and Two Dimensions
Dynamics and Planetary Motion
Work, Energy and Linear Momentum

Chapter 3. FLUID MECHNICS (2hrs.)
Properties of Bulk Matter
Density and Pressure in Static Fluids
Buoyant Force and Archimedes' Principles
Moving Fluids and Bernoulli Equations (Fluid Dynamics)

Mid Exam

Chapter 4. HEAT AND THERMODYNAMICS (2hrs.)

The concept of Temperature and the Zeroth law of Thermodynamics

Thermal Expansion

The Concept of Heat, Work and Internal Energy

Specific Heat and Latent Heat

Heat Transfer Mechanisms

The First Law of Thermodynamics

Chapter 5. OSCILLATIONS, WAVES AND OPTICS (6hrs.)

Simple Harmonic Motion

The simple Pendulum

Wave and Its Characteristic

Resonance

The Doppler Effect

Chapter 6. ELECTROMAGNETISM AND ELECTRONICS (12hrs)

Coulomb's Law and Electric Fields

Electric Potential

Current, Resistance and Ohm's Law

Electrical Energy and Power

Equivalent Resistance and Kirchhoff's Rule

Magnetic Field and Magnetic Flux Energy

Electromagnetic Induction

Insulators, Conductors and Semiconductors

Diodes

Transistors

Chapter 7. Cross Cutting Application of Physics (2hrs)

Application in Agriculture

Physics and Industries and Computer Science

Physics in Health Sciences and Medical Imaging

Physics and Archeology

Application in Earth and Space Sciences

Application in Power Generation

Final Exam

References

➢ Serway, R. A. and Vuille, C., *College Physics*, 11th ed., Cengage Learning, Boston, USA.

➢ Young, Freedman and Lewis Ford, *University Physics with Modern Physics*.

➢ Douglas C. Giancoli, *Physics for scientists and Engineers with Modern Physics*.

➢ David Halliday, Robert Resnick and Gearl Walker, *Fundamentals of Physics*.

➢ Hugh D. Young Sears Zemansky, *College Physics* 9 th ed.

➢ Herman Cember and Thomas A. Johnson, *Introduction to Health Physics*, 4 th ed., 2008.

➢ William R. Hendee and E. Russell Ritenour, *Medical Imaging Physics*, 4 th ed., 2002.

➢ Tayal D. C., *Basic Electronics*, 2nd, ed., Himalaya Publishing House Mumbai, 1998.

➢ Theraja B. L., R. S. Sedha, *Principles of Electronic Devices and Circuits*, S. Chand and Company Ltd, New Delihi, 2004.