Course Syllabus of PHYS145 (Spring 2018)

4(3+1) hours, Pre-requisite: None

Textbook PHYSICS FOR THE LIFE SCIENCES THIRD EDITION.

ZINKE-ALLMANG NEJAT GALIANO-RIVEROS BAYER CHEN, Cengage, 2017.

Part I: Mechanics:

CHAPTER 2   Kinematics

2.1: Setting Up the Coordinate System
2.2: Motion in One Dimension
2.3: Motion in Two Dimensions
2.4: Uniform Circular Motion

CHAPTER 3   Forces

3.1: What Is a Force?
3.2: Properties of a Force
3.3: Action of a Force
3.4: Measuring Forces
3.5: Categories of Forces
3.6: Fundamental Forces
3.7: Non-fundamental Forces
3.8: Free Body Diagram
3.9: Equilibrium

CHAPTER 4   Newton's Laws

4.1: Newton's Laws of Motion
4.2: Free Body Diagram
4.3: Newton's First Law
4.4: Newton's Second Law
4.5: Newton's Third Law
4.6: Application of Newton's Laws
4.7: Weight and Apparent Weight
4.8: Dynamics of Uniform Circular Motion and Centripetal Force

CHAPTER 5   Centre of Mass and Linear Momentum

5.1: Centre of Mass Definition
5.2: Linear Momentum and Impulse
5.3: Newton's Third Law Applied to Internal Forces
5.4: Conservation of Linear Momentum

CHAPTER 6   Torque and Equilibrium

6.1: Force and Extended Object
6.2: Torque
6.3: Mechanical Equilibrium for a rigid Object
6.4:Classes of Levers and Physiological Applications
6.5: Torque and rotational Motion

CHAPTER 7   Energy and Its Conservation

7.1: Observations about Energy
7.2: Defining Work
7.3: Kinetic and Potential Energy
7.4: Is Mechanical Energy Conserved?

Part II: Thermodynamics and Fluid Mechanics

CHAPTER 8   Gases

8.1: The Basic Parameters of the respiratory System at rest
8.2: Pressure–Volume relationships of the Air in the Lungs
8.3: The Empirical Gas Laws
8.4: Mechanical Model of the Ideal Gas
8.5: Energy Contained in the Ideal Gas

CHAPTER 11   Static Fluids

11.1: Model System: The Ideal Stationary Fluid
11.2: Pressure in an Ideal Stationary Fluid
11.3: Buoyancy
11.4: Fluid Surfaces

CHAPTER 12   Fluid Flow

12.2: Flow of an Ideal Dynamic Fluid
12.3: Flow of a Newtonian Fluid

Part III: Basic Electricity

CHAPTER 16   Electric Force and Field

16.1: Electric Charge and Force
16.2: Newton's Laws and Charged Objects
16.3: Electrical Phenomena in Life Science Applications
16.4: Electric Field

CHAPTER 17 Electric Energy and Potential

17.1: The Electric Energy
17.2: The Electric Potential
17.3: Conservation of Energy
17.4: Capacitors

CHAPTER 18   The Flow of Charges

18.1: Electric Current and resistance
18.2: Electrochemistry of resting Nerves

Part IV: Atomic, Electromagnetic, and Optical Phenomena:

CHAPTER 19   The Atom

19.1: The Atom in Classical Physics
19.2: A Semi-classical Model for Hydrogen
19.3: Quantum Mechanical Model of the Atom

CHAPTER 21   Geometric Optics

21.1: What Is Optics?
21.2: Reflection
21.3: Refraction
21.4: Applications in Optometry and Ophthalmology
21.5: The Light Microscope

CHAPTER 22   The Atomic Nucleus

22.1: Stable Atomic Nuclei
22.2: Nuclear Force and Energy
22.3: Radioactive Decay