

Department of Physical Sciences
School Of Engineering and Computer Science
Independent University, Bangladesh

Course Outline of University Physics – I

Course No : PHY 101

Semester : Spring 2017

Section : all

This is one of the courses offered by the university, which fulfills the requirement of Basic Sciences for graduation from the university. This course is mandatory for the students who wish to major in Physics, Mathematics, and Computer Science (CS) or in any Engineering Subject. The course forms a one-year standard course in University Physics. There is no prerequisite for this course though it is highly recommended that the students must have a fair amount of background in mathematics. Specially, knowledge of Calculus will be required sometimes. The course will lay emphasis mainly upon physical description of processes rather than complicated mathematical derivations.

Assessment and Grading Procedures

Students are required to come to the class on time and are requested to follow the attendance policy strictly which has been set by the university. **Home assignment and problems will be assigned for practice, regularly. Students must submit the assignment within due date declared by faculty.** Assessment will be based on the following weighting:

Class Test-I	: 15%
Midterm Exam	: 25%
Class Test - II	: 15%
Assignments & Attendance	: 15%
Final Exam	: 30%

Note: The students are advised to sit in the exam in the prescribed dates. No extra test will be arranged for the students who will fail to sit for their test on prescribed dates

At the end of the course a letter grade will be awarded to students based upon their performance in all tests conducted over the length of the semester. The break up of the final grade will be calculated with the following schedule

85% and above	A	60% to less than 65% :	C+
80% to less than 85%:	A-	55% to less than 60%:	C
75% to less than 80%:	B+	50% to less than 55%:	C-
70% to less than 75%	B	45% to less than 50%:	D+
65% to less than 70%:	B-	40% to less than 45%:	D
Less than 40%		F	

Tentative Dates of the Exams (These dates may be changed with prior notification, if unavoidable circumstances arise)

Class Test-I : 1st February, 2017, Wednesday [Syllabus: Ch.1– Ch. 2 of the course outline]

Midterm Exam: 22nd February, 2017, Wednesday [Syllabus: Ch.3 – Ch. 6 of the course outline]

Class Test – II: 13th March, 2017, Monday [Syllabus: Ch.7 – Ch. 8 of the course outline]

Final Exam : According to the green book [Syllabus: Ch. 8, Ch. 9, Ch.10, Ch. 11, & Ch. 12]

References

1. *Fundamentals of Physics*: David Halliday; Robert Resnick; Jearl Walker: John Wiley & Sons.
2. *University Physics*: Sears; Zemansky and Young: Addition Wesley Publishing Company: 10th edition.

Course Description

Mechanics

1. Introduction, units, physical quantities and vectors

Introduction; Fundamental quantities; Dimension and units; Introduction to vectors; Components of vector; Dot and Cross product of two vectors.

2. Motion in One-dimension and Two-dimensions

velocity; acceleration; Motion with constant acceleration; free falling bodies;; Motion of a projectile.

3. Newton's Laws of Motion

Introduction to the equilibrium and the force; Newton's first law of motion; Newton's third law of motion; The equilibrium condition of a body; Newton's second law of motion; Concept of inertial mass; Newton's law of gravitation; Concept of gravitational mass; Weight; Application of Newton's law.

4. Work, Energy and Momentum:

Definition of work; Work done by a varying force; Kinetic and Potential energy; Power; Work-Energy theorem; Momentum, Conservation law for momentum and energy; Center of mass.

5. Rotation

Circular motion, Angular velocity and acceleration; Rotation with constant angular acceleration; Kinetic energy of rotation—moment of inertia; Work and Power in rotational motion; Relation and comparison between linear and angular quantities; Conservation of angular momentum.

Heat & Thermodynamics

6. Temperature and Heat

Concept of temperature and heat; Quantity of heat; Heat capacity & Specific heat; Change of phase; Heat transfer : conduction, convection & radiation process.

7. First Law of Thermodynamics

Heat as energy and work; Work and heat in volume changes; Internal energy; Adiabatic, Isothermal, Isobaric and Isochoric process; Differential form of first law.

8. Second Law of Thermodynamics

Heat engines; Refrigerator; Second law of thermodynamics; Carnot's cycle; Entropy and the second law.

Waves & Optics

9. Periodic motion

Elastic restoring force; Simple harmonic motion (SHM); Differential equation of SHM & its solutions with explanation; Examples of SHM.

10. Mechanical Waves, Vibrating Bodies and Acoustic Phenomena

Periodic Waves; Mathematical description of a wave; Boundary condition for a string; Standing waves; Vibration of a string fixed at both ends; Sound Waves; Intensity level and loudness; Quality and pitch; Beats; The Doppler effects; Application of acoustic Phenomena

11. Nature and propagation of Light, Reflection & Refraction, Image

Nature; Reflection and Refraction; total internal reflection; Focal point and focal length of a spherical surface.

12. Interference and Diffraction

Coherent sources and Interference; Young's Experiment; diffraction from a single slit; diffraction grating.

<u>No. of Lectures</u>	<u>Contents</u>	<u>Reference</u>
1.	<u>Introduction and general discussion about the course, grading system etc. Introduction, units, physical quantities and vectors: Introduction; Fundamental quantities; Dimension and units; Introduction to vectors; Components of vector;</u>	<u>Ref-2: Page: 1-11</u>
2.	Dot and Cross product of two vectors, Exercise on Vectors	<u>Ref-2: page: 12-17</u>
3.	Motion in One-dimension and Two-dimensions: Velocity; acceleration; Motion with constant acceleration; free falling bodies;	<u>Ref-2: page: 39-52</u>
4.	<u>Motion of a projectile and exercises</u>	<u>Ref-2: page: 54-57, 88-94, 110-111</u>
5.	Newton's Laws of Motion : Introduction to the equilibrium and the force; Newton's first law of motion; Newton's third law of motion; The equilibrium condition of a body; Newton's second law of motion;	<u>Ref-2: page: 18-29</u>
6.	Class Test -I	Ch 1-2
7.	<u>Concept of inertial mass; Newton's law of gravitation; Concept of gravitational mass; Weight; Application of Newton's law and exercises</u>	<u>Ref-2: page: 59-73, 76-78</u>
8.	Work, Energy and Momentum: Definition of work; Work done by a varying force; Kinetic and Potential energy; Power; Work-Energy theorem.	<u>Ref-2: page: 115-135, 138-140</u>
9.	<u>Impulse and momentum, Conservation law for momentum and energy; Center of mass</u>	<u>Ref-2: page: 143-157, 160-162</u>
10.	Rotation: Circular motion, Angular velocity and acceleration; Rotation with constant angular acceleration; Kinetic energy of rotation—moment of inertia; Work and Power in rotational motion; Relation and comparison between linear and angular quantities; Conservation of angular momentum. Exercises on Rotation	<u>Ref-2: page: 179-182 182-200, 297-310</u>
11.	Midterm	Ch 3-6
12.	Temperature and Heat: Concept of temperature and heat; Quantity of heat; Heat capacity & Specific heat; Change of phase and exercises, Heat transfer : conduction, convection & radiation process;	<u>Ref-2: page: 297-310, 313-325</u>
13.	First Law of Thermodynamics: Heat as energy and work; Work and heat in volume changes; Internal energy; Adiabatic, Isothermal, Isobaric and Isochoric process; Differential form of first law.	<u>Ref-2: page: 346-358</u>
14.	Second Law of Thermodynamics: Heat engines; Refrigerator; Second law of thermodynamics; Carnot's cycle; Entropy and the second law.	<u>Ref-2: page: 364-382</u>
15.	Class Test-II	Ch 7-8
16.	Periodic motion: Elastic restoring force; Simple	<u>Ref-2: page: 223-238</u>

	harmonic motion (SHM); Differential equation of SHM solutions with explanation; Examples of SHM, Solutions with explanation; Examples of SHM	
17.	Mechanical Waves and Vibrating Bodies: Periodic Waves; Mathematical description of a wave; <u>Boundary condition for a string;</u>	<u>Ref-2: page: 403-408, 420</u>
18.	Standing waves; Vibration of a string fixed at both ends; longitudinal standing waves; Acoustic Phenomena: Sound Waves; Intensity level and loudness; Quality and pitch; Beats; The Doppler effects; Application of acoustic Phenomena	<u>Ref-2: page: 422-430</u>
19.	Exercises of Ch 8 & 9	
20.	Nature and propagation of Light, Reflection & Refraction, Image Nature; Reflection and Refraction; total internal reflection; Focal point and focal length of a spherical surface.	<u>Ref-2: page: 711-721; 733-741</u>
21.	Focal point and focal length of a spherical surface.	<u>Ref-2: page: 711-721; 733-741</u>
22.	Diffraction: Diffraction from a single slit; diffraction grating, Fresnel's diffraction.	<u>Ref-2: page: 787-794;</u>
23.	Interference : <u>Coherent sources and Interference; Young's Experiment;</u>	<u>Ref-2: page: 773-778;</u>
24.	<u>Coherent sources and Interference; Young's Experiment;</u>	<u>Ref-2: page: 773-778;</u>
25.	<u>Review Class of the syllabus for Final Exam</u>	<u>Ref-2: page: 711-721; 733-741, 787-794</u>
26.	<u>Final Exam</u>	<u>Ch 8-12</u>