



## Course Title: Physics - I

Course # PHY 107.

Section # 5

Fall Semester 2018

Department of Mathematics and Physics

Bashundhara, Dhaka - 1229

### • Instructor Information

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### • Course Information

Class Meeting Time : 9:40am - 11:10am Monday and Wednesday each week  
Class Meeting Place : SAC 211  
Office Hours : 9:00am-9:30am and 11:20am-12:20pm from Sunday to Wednesday or by appointment.  
Course webpage : <https://abukhan.weebly.com/>  
Visit this page frequently. Any announcement and the quiz/exam solutions will be posted here.

Required Textbooks : **Principles of Physics** (9<sup>th</sup> Ed.). Author(s): Halliday, Resnick and Walker (available in the library).

You can also use **Physics for Scientists and Engineers : A Strategic Approach with Modern Physics** (3<sup>rd</sup> Ed.). Author(s): Randall D Knight (available in the library).

Course description : This is designed to introduce the principles of newtonian mechanics at the freshmen level of the undergraduate study for engineering majors or equivalent. The key concepts to be developed throughout the semester are: vectors, equations of motions, Newton's laws, conservation laws of energy, momentum, the Work-Energy theorem, extension of linear motion into rotational motion including the conservation laws, gravitation, waves and oscillations. Thermal systems and variables. Energy conservation in a thermal system. Laws of Thermodynamics.

Course Objectives : The objective is to develop the following skills

- Reexpress or reformulate a physical problem in proper mathematical form, like vector equations, differential equations, etc.
- Understand and apply the fundamental conservation laws in mechanics to solve various problems, such as conservation law of total energy,
- Use vector calculus to solve problems in two or three dimensions,
- Combine different simple concepts to solve an apparently complicated problem, as for example, the conservation laws of energy and linear momentum can be used to find the energy lost and velocity after a collision between two objects on a rough surface,
- Implement energy conservation law in thermal systems, and estimate the effects of heat and temperature in a mechanical system.

Grade Distribution : The final grade is based on the attendance, quiz, two midterms and the **mandatory** final exam contributing 5%, 10%, 50% and 35% respectively. Minimum 20 class attendances are required to get full marks. **Note that missing the final exam will earn you an automatic failing grade.** There will be **six** quizzes and the best **four** will be considered to finalize your final grade.

### • Rules and Regulations

Attendances policy : Arriving 10 minutes late or more is automatic absent.  
Make-up policies : There will be no make-up for any missed mid-term exams  
No make-up for any missed quizzes.  
Class room policy : The cell phone must be turned off during class times and in any exams.  
Each student must use his/her own calculator. Calculators can not be shared.  
Dishonesty policy : During quizzes, mid-terms and final exam each student must work alone. Any kind of unauthorized contribution(s) will be treated as cheating and will be given a zero.  
**Each student must bring his/her own calculator in quizzes and exams.**

- Course Objectives and the Learning Outcome:

After successful completion of the course, a student will achieve certain skills, and these skills are classified as the Course Learning Outcome (CLO)s according to Bloom's Taxonomy. For this course, the CLOs along with their assessment methods and tools are the following.

CLO-#	Outcome types	Bloom's Taxonomy level	Delivery method	Assessment tools
CLO-1	remember the definitions, use the definition to express the phenomena	C1, C2, P1	Lecture, Discussion	Quiz, exam
CLO-2	identify and apply the knowledge of calculus to set up the equation to be solved correctly	C3, C4, P2, P3	Lecture, Discussion	Quiz, exam
CLO-3	apply the rules of calculus to solve a mathematical problem	C4, C5, P3, P4	Lecture, Discussion	Quiz, exam
CLO-4	Interpret the result and it's consequences	C5, C6, P1, P3, P5	Lecture, Discussion	Quiz, exam

- Lecture Details: The tentative course/lecture schedule<sup>1</sup> is given below. These may be changed if necessary.

Date	Topics
Lecture - 1 (26/09/2018)	: Introduction. Measurement, units, dimensions, base units, Scalars and vector quantities. Pythagorean Theorem.
Lecture - 2 (01/10/2018)	: Vector addition rules using components and geometrical methods, Scalar and vector product rules.
Lecture - 3 (03/10/2018)	: Motion in one dimension. Displacement, Speed, Velocity and Accelerations; Free fall. Motion in Two and Three dimensions.
Lecture - 4 (08/10/2018)	: Position, Displacement and acceleration vectors, average and instantaneous quantities. Projectile motion. Uniform circular motion. <b>Quiz-1.</b>
Lecture - 5 (10/10/2018)	: Newton's laws of motion. Force and mass. Types of forces. 1 <sup>st</sup> and 2 <sup>nd</sup> laws. Free body diagrams.
Lecture - 6 (15/10/2018)	: 3 <sup>rd</sup> law, frictional forces.
Lecture - 7 (17/10/2018)	: Work and Energy. Work done by a force, Work-Energy Theorem. Work done by gravitational and spring forces, Power. <b>Quiz-2.</b>
Lecture - 8 (22/10/2018)	: <b>Mid-Term Exam - I.</b>
Lecture - 9 (24/10/2018)	: Potential energy and the conservation law of energy. Conservative forces and the path independence of work done, potential curve.
Lecture - 10 (29/10/2018)	: Conservation law of energy with and without frictional work. Linear Momentum. 2nd law revisited, conservation law of momentum, Impulse.
Lecture - 11 (31/10/2018)	: Center of Mass. Rotation. Rotational equation of motion. Relation between linear and angular or rotational variables, moment of inertia, kinetic energy of rotation. <b>Quiz-3.</b>
Lecture - 12 (05/11/2018)	: Torques, angular momentum, conservation laws. Parallel axis theorem.
Lecture - 13 (07/11/2018)	: Static equilibrium.
Lecture - 14 (12/11/2018)	: Newton's law of Gravitation, superposition principle, acceleration near earth surface and at an altitude.
Lecture - 15 (14/11/2018)	: Escape velocity. Kepler's laws of planetary motion. <b>Quiz-4.</b>
Lecture - 16 (19/11/2018)	: <b>Mid-Term Exam - II.</b>
Lecture - 17 (26/11/2018)	: Elastic systems and the Hook's Law. Spring and the SHM. Position, velocity and acceleration of mass-spring system.
Lecture - 18 (28/11/2018)	: Energy in a SHM. Travelling waves.Wave equation.
Lecture - 19 (03/12/2018)	: Standing waves, interference of travelling waves.
Lecture - 20 (05/12/2018)	: Calorimetry. Heat and Energy. Thermal equilibrium and the temperature. Conduction. Latent heat. <b>Quiz-5.</b>
Lecture - 21 (10/12/2018)	: Thermal variables and systems. 1 <sup>st</sup> law of thermodynamics and the conservation law of energy.
Lecture - 22 (12/12/2018)	: Entropy and the 2 <sup>nd</sup> law of thermodynamics.
Lecture - 23 (17/12/2018)	: Examples and applications. <b>Quiz-6.</b>
Lecture - 24 (19/12/2018)	: Reviews (if time permits)
<b>Final Exam</b> <sup>2</sup>	: <i>Look for the NSU announcement near the end of the semester.</i>

<sup>1</sup>The lecture and exam date(s) and time(s) may be changed by the NSU authority. If there is any such changes, we will follow the latest academic calender as announced by the NSU registrar office.

<sup>2</sup>The date of the final exam will be announced by the NSU authority in due time