# Physics 107
# Fall 2018
# Department of Mathematics and Physics

Bashundhara, Dhaka 1229

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## Instructor Information

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## Course Information

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| Class Meeting Time | : | ST (4:20 pm to 5:50 pm) |
| Class Meeting Place | : | SAC 313 |
| Office Hours | : | ST (1:30 pm to 2:30 pm) |
| Required Textbooks | : | Fundamentals of Physics, Halliday and Resnick, 9th Edition |
| 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.

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| Grade distribution | : | Attendance (5 %), Quiz (10 %), HW (10 %) , 2 Midterm (50 %), Final (25%) |
| Attendance | : | Through RFID |
| Expectation/Norms | : | Attend all classes. Participate in discussion. |
| Exams | : | There will be no make-up for any missed quizzes or exams. You will automatically be assigned a failing grade if you miss the final exam |
| Honor Code | : | Interaction among students is allowed to better understand concepts to complete tasks assigned during the semester, but, each student must turn in his/her own work. |

# Course Objectives and the Learning Outcomes

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, P3, P5 | Lecture, Discussion | Quiz, exam |
| CLO-5 | Use the understanding of CLO-4 and connect to the advanced level (or next level) | C6, P1 | Lecture, Discussion | Quiz |

# Topics/Lecture Details

Introduction. Measurement, Base Units
Vectors/Scalar: Addition and product rules
1D motion: Displacement, Velocity, Acceleration. Free fall
Motion in 2D and 3D, Projectile motion
Force and Motion 1: Newton's Laws (1st and 2nd)
Force and Motion 2: 3rd Law, Friction
Work and Energy, Work-Energy Theorem, Work done by special forces
Potential Energy and Energy Conservation- Potential Curve
Conservation of Energy. Conservation of Momentum
Center of Mass, Linear Momentum. Moment of inertia, K.E of rotation
Torque and Angular Momentum. Parallel Axis Theorem
Equilibrium/Elasticity
Gravitation: Superposition
Potential energy, Keplers Laws, Orbits/ Satellites Gravitation
Simple Harmonic Motion, Uniform Circular Motion
Mass-Spring System, Energy Associated with SHM
Wave Equation: Standing and Traveling waves
Temperature and Heat
Thermal Variables and Systems, 1st Law of Thermo
Kinetic Theory of Gases
Entropy and second law of thermodynamics

# Special Notes

1. You must read the reference book (and look into the examples) so to be aware of what is going on in the class.
2. You should attend all classes to receive updates about quiz, assignments and exams.
3. The theories as well as the examples in the slides are really important for exams. Carefully study each slide if you would like to perform well in the exams.


**I will do my best to make you develop interest in Physics. Your job is to put your best honest effort......**

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This course outline is a tentative one. Slight changes may show up if needed