Syllabus of Foundation Year Subject

Subject Title : College Physics I
Code : AP101
Level : 1
Credit Value : 3.00
Offering Department : Department of Applied Physics
Offering Semester : 1
Pre-requisite(s) : Nil
Co-requisite(s) : Nil
Exclusion(s) : Nil
Medium of Instruction : English

Contact Hours
Classroom teaching and laboratory experiments
Lecture : 34 hours
Laboratory : 8 hours
Total : 42 hours

Multimedia teaching/learning and other activities
Virtual laboratory : 12 hours
Self-study : 60 hours
Total : 72 hours

Objectives
This is the first bridging course in physics of the Foundation Programme for students admitted from mainland. It provides a broad foundation in mechanics and thermal physics, preparing students to study science, engineering, or related programmes.

Learning Outcomes
On successful completion of this subject, students are expected to be able to:
1. solve simple problems in single-particle mechanics using calculus and vectors;
2. solve problems in mechanics of many-particle systems using calculus and vectors;
3. solve problems on rotation of rigid body about fixed axis;
4. define simple harmonic motion and solve simple problems;
5. explain ideal gas laws in terms of kinetic theory;
6. apply the first law of thermodynamics to simple processes;
7. solve simple problems related to the Carnot cycle;
8. solve simple problems in travelling waves;
9. explain the formation of acoustical standing waves and beats; and
10. use Doppler’s effect to explain changes in frequency received;

Teaching and Learning Approach
1. Lectures are given to deliver the subject outline and key physics concepts to the students. The students will also get the guidance on further reading.
2. Assignments are used to help the students gain analytical abilities through problem-solving and also to help them strengthen the concepts taught.
3. Laboratories are designed to help the students gain hands-on experience in the operation of equipment and apply their knowledge in the experiments.

Assessment Method
Continuous Assessment : 40%
Examination : 60%
Total : 100%
Keyword Syllabus
1. Preparation in mathematics
   Review of algebra, geometry and trigonometry; Function and graph; Derivative; Integration;
   Vectors and coordinate system.
2. Mechanics
   Calculus-based kinematics, dynamics and Newton’s laws; Calculus-based Newtonian
   mechanics, involving the application of impulse, momentum, work and energy, etc.;
   Conservation law; Gravitation field; Systems of particles; Collisions; Rigid body; Rotation;
   Angular momentum; Oscillations and simple harmonic motion; Pendulum; Statics and
   elasticity.
3. Thermal physics
   Conduction, convection and radiation; Black body radiation and energy quantization; Ideal
   gas and kinetic theory; Work, heat and internal energy; First law of thermodynamics;
   Entropy and the second law of thermodynamics; Carnot cycle; Heat engine and
   refrigerators.
4. Waves
   Longitudinal and transverse waves; Travelling wave; Doppler effect; Acoustics.

Essential Reading and CD-ROM
   Windows. USTC.

Reference List
   Hill.