### 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


Reference List