

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	: <u>8 hours</u>
Total	: 42 hours

Multimedia teaching/learning and other activities

Virtual laboratory	: 12 hours
Self-study	: <u>60 hours</u>
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	: <u>60%</u>
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

1. Young and Freedman. (2007). *University Physics*. Volume 2, 12th edition. Pearson.
2. (2000). *Physics CAI* in CD-ROM. USTC.
3. (2000). *Computer Simulation System for College Physics Experiment*. Version 2.0 for Windows. USTC.

Reference List

1. Halliday, Resnick and Walker. (2005). *Fundamentals of Physics*. 7th edition. Wiley.
2. Jewett and Serway (2008). *Physics for Scientists and Engineers with Modern Physics*. Volume 1, 7th Edition. Cengage Learning.
3. Giancoli. (2000). *Physics for Scientists and Engineers*. 3rd edition. Prentice Hall.
4. Giambattista, Richardson and Richardson. (2007). *College Physics*. 2nd edition. McGraw-Hill.
5. Jewett and Serway, Serway's. (2006). *Principles of Physics*. 4th edition. Thomson.
6. Knight. (2004). *Physics for Scientists and Engineers with Modern Physics*. Pearson.