

Course Description

PHY1020 | General Education Physics | 3 credits

This course offers a comprehensive survey of physics, covering a wide range of topics including motion, Newton's laws, energy, sound, heat, electricity, magnetism, and optics. Emphasizing a conceptual understanding of physics, the course integrates critical thinking skills and real-world applications. Student learning outcomes: students will critically evaluate everyday phenomena using the scientific method; students will explain the basis of physical principles (such as conservation laws) and how they apply to everyday phenomena; students will interpret information conveyed in diagrams and graphs; and students will perform simple calculations relevant to real world problems.

Course Competencies

Competency 1:

The student will demonstrate knowledge of what science is by:

- Describing the steps involved in the scientific method.
- Recognizing the necessity of the scientific method for understanding the physical world.
- Identifying important contributions of science to technology, economics, history and society.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 2:

The student will demonstrate knowledge of what physics is by:

- Describing the subject of study, scope and limitations of physics as a science.
- Identifying the major subdivisions of physics.
- Identifying important physicists.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 3:

The student will demonstrate knowledge of the scientific notation by:

- Describing the standard form of scientific notation.
- Expressing various numbers in scientific notation.
- Utilizing scientific notation to perform basic numerical operations.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 4:

The student will demonstrate knowledge of scientific units and measurements by:

- Identifying the main systems of units.
- Identifying the main multiples and submultiples within each system.
- Distinguishing between base units and derived units.
- Converting measurements.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 5:

The student will demonstrate knowledge of kinematics by:

- Identifying the main types of motion.
- Describing motion in terms of position, distance, speed, velocity and acceleration.
- Performing basic calculations on motion.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 6:

The student will demonstrate knowledge of dynamics by:

- Identifying force as the cause of motion.
- Distinguishing between mass and weight.
- Describing Newton's laws of motion.
- Performing basic calculations using the laws of motion.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 7:

The student will demonstrate knowledge of conservation laws by:

- Distinguishing between work, kinetic energy, potential energy, total energy, and linear momentum and angular momentum.
- Expressing and using in basic calculations the law of conservation of energy.
- Expressing and using in basic calculations the law of conservation of linear momentum.

- Expressing and using in basic calculations the law of conservation of angular momentum.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 8:

The student will demonstrate knowledge of fluids by:

- Distinguishing between density and pressure.
- Describing Pascal's principle and its applications.
- Describing Archimedes' principle and its applications.
- Describing Bernoulli's principle and its applications.
- Distinguishing the different kinds of fluid flow.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 9:

The student will demonstrate knowledge of thermodynamics by:

- Describing the laws of thermodynamics.
- Distinguishing between temperature and heat.
- Identifying the main types of heat flow.
- Describing the relationship between temperature, pressure and volume.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 10:

The student will demonstrate knowledge of electricity by:

- Distinguishing between electric charge, electric force, electric field, electric potential and electric current.
- Describing Coulomb's law and using it in basic calculations.
- Describing Ohm's law and using it in basic calculations.
- Distinguishing between series and parallel connections in circuits.
- Distinguishing between direct and alternating currents.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 11:

The student will demonstrate knowledge of magnetism by:

- Distinguishing between magnets, magnetic force, magnetic field, and magnetic torque.
- Describing how magnetic fields affect the motion of charges and currents.
- Describing electromagnetic induction and its applications.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 12:

The student will demonstrate knowledge of optics by:

- Distinguishing between ray and wave front.
- Distinguishing between reflection, refraction, dispersion, interference and diffraction.
- Describing the law of reflection and using it in basic calculations.
- Describing the law of refraction and using it in basic calculations.
- Identifying fundamental optical instruments.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 13:

The student will demonstrate knowledge of relativity by:

- Describing the postulates of special relativity.
- Describing time dilation and length contraction.
- Describing the relation between mass and energy and its implications.
- Describing the general ideas of general relativity and its implications.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data

Competency 14:

The student will demonstrate knowledge of atomic, nuclear and particle physics by:

- Describing the main components of the atom.
- Describing Bohr's model of the atom.
- Describing the quantized nature of atomic properties.
- Describing nuclear particles and the force between them.
- Describing radioactivity and identifying its main types.
- Identifying the main types of subatomic particles.

Learning Outcomes

- Communication
- Critical thinking
- Numbers / Data