Educational Goals for Physics Students & Assessable Learning Outcomes

PHY 210 GENERAL PHYSICS I / 3 credits

Newtonian mechanics, sound propagation, heat transfer, and thermodynamics using algebra and trigonometry. Prerequisite: MTH 110 or permission of instructor.

Physics Program Objectives

There are several general goals of the Physics program that students completing the physics program should have. A non-exhaustive list of these program objectives include:

(a) Ability to perform a mathematical formulation of a physical system
(b) Ability to discuss (mathematically and linguistically) a physical system drawing upon a well-developed foundation built upon physical fundamentals.
(c) Ability to formulate complex arguments based upon physical foundations and which are testable by experimentation.
(d) Ability to produce technologically enabled students with an understanding of the basis for experimental design.

A non-exhaustive list of intended learning outcomes follows

(a) Ability to convert units.
(b) Ability to work with algebraic vectors.
(c) Ability to describe 1-dimensional motion in the presence of uniform accelerations.
(d) Ability to describe 2-dimensional motion in the presence of uniform accelerations.
(e) Ability to use Newton's laws of motion in algebraic form.
(f) Ability to construct and use free-body diagrams in problem formulation.
(g) Ability to apply principles of energy conservation for conservative and non-conservative systems.
(h) Ability to work with Newton's law of gravitation and gravity in general as an example of a conservative force.
(i) Ability to provide mathematical analysis necessary to describe systems undergoing uniform circular motion.
(j) Ability to apply principles of momentum conservation to physical systems.
(k) Ability to provide mathematical analysis necessary to describe systems undergoing non-uniform circular motion in the presence of uniform external torques.
(l) Ability to provide mathematical analysis necessary to describe systems undergoing simple harmonic oscillation and the effect of linear restoring forces upon systems.
(m) Ability to provide mathematical analysis necessary to describe pulses, waves, traveling harmonic waves, transverse and longitudinal oscillations.
(n) Ability to work with Archimedes' principle and Bernoulli's equation[4].
(o) Ability to model the non-leaky ideal gas thermodynamically and to expand this theory to cover systems with more than one degree of freedom.
(p) Calorimetry and linear expansion.
(q) Ability to apply the four laws of thermodynamics.
(r) Ability to apply black body radiation[6], Newton's law of cooling and the greenhouse effect.