## Educational Goals for Physics Students & Assessable Learning Outcomes
## PHY 241 FUNDAMENTALS OF PHYSICS I LABORATORY / 1 credit

Experimental techniques for Fundamentals of Physics I. Corequisite: PHY 240 (/210).

### General Education Objectives (proposed)

**1. Students can apply critical thinking to pose and answer questions.**
**2. Students can use the processes and methods of science and mathematics to demonstrate how reproducible results give rise to the discovery of fundamental laws and the development of theories.**
**3. Students can articulate a basic knowledge of current scientific understanding of the universe and the scientific and mathematical laws that govern it.**
**4l Students can summarize, interpret, analyze, and critically evaluate data and reports relating to the natural sciences and mathematics.**

### 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.

### non-exhaustive list of intended learning outcomes follows

(a) Perform simple experiments designed to complement classroom material.
(b) Analyze data collected in a systematic manner and explore the compliance of this data with anticipated theoretical results.
(c) Write a detailed technical report covering the particular experiment at hand.
(d) Ability to discuss with colleagues the physical system under study.
(e) Develop an experiential-based method of inquiry leading to a scientifically creative individual.

The present incarnation of the lab experiments is composed of the following experiments:

(1) Forces and Force Tables (hands-on experience with vectors)
(2) Motion in 1 and 2 dimensions
(3) Inclined planes and friction (statics, dynamics and non-conservative forces)
(4) Atwood's Machine, Mechanical Advantage, Work and Energy
(5) Centripetal Force and Hooke's Law.
(6) Static Equilibrium
(7) Simple Harmonic Oscillation
(8) Standing Waves and Vibrations
(9) Archimedes' Principle and Pressure

(10) Thermodynamics (linear expansion and calorimetric measurements)