

Department of Physics – Assessment Plan

Program Learning Objectives (What are the *broad* learning outcomes for the program?)

1. Students will learn fundamental principles governing the physical universe, and develop an understanding of the scientific method and its application to the advancement of knowledge.
2. Students will develop effective problem-solving skills, including the use of modeling, estimation, alternative representations, and proportional reasoning.
3. Students will learn applications of conceptual and mathematical understanding of physics principles to real-world problems. Examples: global warming, use of fossil fuels, public transportation, etc.
4. Students will develop effective skills in written, oral, and computer communication in a scientific setting, as well as an awareness of science ethics.
5. Students will gain hands-on experience in a variety of laboratory techniques, incorporating the campus “Learn by Doing” philosophy.
6. Students who are physics majors or minors will gain an appreciation for physics as a discipline, and will develop a more in-depth understanding of some area of physics.
7. Students who are physics majors, upon graduation, will be prepared for graduate work, or for careers in teaching, industry, or public agencies; they will be able to apply their physics experience and knowledge to analyze new situations.

Course Learning Outcomes (What are the *specific* skills or knowledge gained?)

1. PHY 120-series (PHY 121/L, 122/L, 123/L) College Physics – introductory service course sequence for students not majoring in physical sciences or engineering
 - a. Basic understanding of the physical principles and concepts governing motion, force, work, energy, momentum, fluid mechanics, heat, oscillatory motion, wave motion, sound, light, optical devices,

electricity, magnetism, simple circuits, atomic physics, and nuclear physics.

- b. Development of skills necessary to solve problems at the algebra/trig level, including use and understanding of vectors, representation of information using appropriate alternative representations, and ability to simplify problems by identifying appropriate models.
- c. Ability to (safely) employ experimental apparatus, and make simple, accurate physical measurements (with appropriate units), and understand the limitations of various measuring devices.
- d. Ability to communicate an understanding of fundamental physics principles and problem solving strategies, as well as an analysis of experimental data and the inherent uncertainties involved.

2. PHY 130-series (PHY 131/L, 132/L, 133/L) General Physics – introductory service course sequence for students majoring in the physical sciences or engineering

- a. Basic understanding of the physical principles and concepts governing mechanics (kinematics and dynamics) of solids and fluids, including oscillations and waves, thermodynamics, electricity and magnetism.
- b. Development of skills necessary to solve problems at the level of introductory calculus, including use of vectors (scalar and vector products), representation of information using appropriate alternative representations, and ability to simplify problems by identifying appropriate models.
- c. Ability to (safely) employ experimental apparatus, and make accurate physical measurements (with appropriate units), and understand the limitations of various measuring devices, with particular emphasis on how measurement uncertainties propagate to yield uncertainties in derived results.
- d. Ability to communicate an understanding of fundamental physics principles and problem solving strategies, as well as an analysis of experimental data and the inherent uncertainties involved.

3. [Other courses or course sequences to be added later]

Assessment Opportunities (Where can data be collected?)

Exams, Problem Sets, Papers, Projects, Laboratory Reports, Presentations, etc.

[For PHY 120-series and PHY 130-series the data will probably be limited to exams, problem sets, and lab reports.]

[For Physics majors additional assessment measures might include GRE scores, acceptance rates for grad school and/or job placement, and ultimately success in graduate school, industry, or teaching as established by interviews or questionnaires.]

Data Analysis (What is the interpretation and significance of the data collected?)

Program Improvement (Discuss, propose, and implement needed changes.)