

PHYC 110 General Physics 1

Course Description

Studies the laws of Newtonian mechanics. Introductory fluid statics and dynamics, heat and thermodynamics, and wave motion and sound. Recommended background: one year of college preparatory physics in high school. (4 credit hours)

Prerequisite: MATH 112, trigonometry or appropriate trigonometry sub scores on Mathematics placement exam or passing grade in high school physics.

Parallel: PHYC 111 is recommended for students who have not attained the recommended background.

Course Objectives

Students in PHYCS 110 learn to:

Identify the basic physical laws in text and mathematical forms and relate them to the physical and life sciences and technology;

Use algebra, trigonometry, and other basic math skills to derive analytical expressions for relating physical quantities;

Interpret and analyze written physics problems including identification of pertinent facts, recognition of what is to be found, and application of physical laws to arrive at a conceptual or quantitative solution;

Predict outcomes and conduct laboratory experiments to test those predictions;

Perform laboratory work using scientific instruments to measure physical quantities;

Apply error analysis methods to experimental data;

Appropriately reduce laboratory data to meaningful form to find data patterns and make comparisons of results with theory; and

Write formal reports summarizing their experimental work in the laboratory.

Course Rationale

Since physics is one of the principal foundations of the sciences, the course is designed to teach students the fundamental principles governing all macroscopic physical systems, to acquaint students with the basic factual knowledge concerning the physical world, and to impart a rudimentary scientific vocabulary. PHYCS 110 is the first course of a traditional non-calculus-based general physics course sequence for students in pre-medicine, the physical and life sciences, technology, teacher preparation, mathematics, and other disciplines. In addition to preparing students to take required pre-professional examinations, the course provides a general knowledge base for work in many disciplines that consider or deal with the

attributes, functions, processes, responses, interactions, and applications of real systems of varying complexity in the physical world, from projectiles to manufacturing machines to human beings. The course advances the critical thinking skills of students; students learn appropriate factual knowledge of the scientific discipline, and this knowledge will lead to intelligent decision-making in an increasingly complex and scientific society. In discussing the discoveries of the physical laws of nature, the personalities, history, societal context, and cultural environment of the field are often described. Critical thinking skills and a rational problem solving methodology are extensively practiced by students in this course through the performance and analysis of laboratory experiments, quizzes, numerical and conceptual homework problems, and class exercises that include live and video demonstrations and computer simulations.

Course Content, Format and Bibliography

Content

Week	Lecture Topic	Lab Topic
1	Physics and Measurement	Lab orientation; pre-testing
2	Motion along a line	Measurement, Uncertainty, and Experimental Error
3	Motion in a plane; Vector analysis	Motion in One Dimension – The Falling Mass
4	Force and Newton's laws of motion	Motion in two dimensions - Projectiles
5	Circular motion	Addition and Resolution of Vectors
6	Conservation of energy	Friction: The Ever-present Force
7	Linear momentum	Conservation of Energy
8	Torque and angular momentum	Ballistic Pendulum and Conservation of Momentum
9	Fluids	Collisions in One and Two Dimensions
10	Elasticity and oscillations	Torque and Rolling Motion
11	Waves	Archimedes' Principle
12	Sound	Simple Harmonic Motion
13	Temperature and ideal gases	Wave Motion and Speed of Sound
14	Heat	Linear Thermal Expansion
15	Thermodynamics	Calorimetry

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Format

The instructional format for PHYC 110 includes: lectures coupled with multimedia material presented using the classroom technology, classroom demonstrations of physical phenomena, and group problemsolving sessions. The multimedia material may include computer-based simulations, spreadsheet calculations, information from the Internet, video disk presentations, and video tapes. Electronic audience response devices, or "clickers," are available and may be used as an integral part of the in-class experience. In addition to three fifty-minute classes each week, the course laboratory is a weekly, predominantly active student engagement, two-hour session during which student teams (two students per team) conduct an experimental investigation on a course topic. An appropriate textbook for this course is Giambattista, Richardson and Richardson, "Physics," McGraw Hill Publishers ISBN 0073327506, or the VOL 1 split of this book. A locally developed laboratory manual is also used. A sample course schedule follows:

Bibliography

Serway, Vuille & Faughn, "College Physics," 9th Ed. ISBN 9780840062062

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