

COURSE PROFICIENCY OUTLINE

PHYSICS - 375

Honors

5 Credits

Purpose

Physics - 375 is offered primarily to juniors and seniors following the completion of a high level chemistry course. Strong mathematics and problem-solving abilities are expected. Previously learned scientific principles, skills, and ideas will be utilized in the course. The outcomes of the course will include the development of the student's knowledge of physics principles, of high-level problem-solving skills and data interpretation, and of an understanding of the applications of physics to natural phenomena. In addition, students will be made aware of careers in physics. In addition, students will be made aware of careers in physics.

I. Student Outcomes 5.1, 5.2, 5.3, 5.4, 5.7

- A. Students will demonstrate an understanding of the terminology, facts, concepts and applications of physics.
- B. Students will demonstrate the ability to utilize physics learning in complex physics-mathematical problem-solving situations.
- C. Students will demonstrate an understanding of physics and technology as related to daily life and the interrelationships of humankind, resources, energy and the environment.
- D. Students will utilize and improve upon the following: critical-thinking skills, study and learning skills, reading, writing, listening and organizational skills, high level problem-solving skills, laboratory manipulative and investigative skills.

II. Content 5.1, 5.2, 5.3, 5.4, 5.6, 5.7, 5.9

- A. Introduction - Physics, The Study of Energy
 - 1. Measurement, metrics and conversions
 - 2. Accuracy, precision, significant figures and scientific notation
 - 3. Problem-solving techniques, graphics and vectors
 - 4. Geometric, algebraic, or physical models in problem solving
 - 5. Science and related career ideas, concepts and information
 - 6. Work of Newton, Maxwell, and Einstein
- B. The Nature of Motion
 - 1. Velocity and acceleration
 - 2. Projectile and periodic motion
 - 3. Newton's Laws and their applications
 - 4. Falling objects
- C. Forces
 - 1. Vector composition and resolution
 - 2. Gravitational force law
 - 3. Friction, parallel forces and Hooke's Law

- D. Conservation of energy and of momentum
 - 1. Mechanical work and power
 - 2. Types of mechanical energy
 - 3. Impulse and change in momentum
 - 4. Isolated systems, outside forces and rotation
 - 5. Outcomes of one dimensional and two-body interactions
- E. Changes in matter and energy
 - 1. Description and energy transfer
 - 2. Behavior-reflection, refraction, diffraction and interference
 - 3. Sound waves - measurement, transmission and control, applications
 - 4. Nature of light energy - various models
 - 5. Light and optics measurements, color, polarization, and applications
- F. Principles of electricity
 - 1. Static effects
 - 2. Measurement of voltage, charge, current, resistance
 - 3. Direct current - sources and circuit studies
 - 4. Heating and magnetic effects
 - 5. Electromagnetism, conversions, energy storage and transfer
- G. Modern physics principles
 - 1. Nature of matter and of the atom
 - 2. Nuclear structure and transformations; radioactivity principles and their applications
 - 3. Fission, fusion, alternate energy sources, concepts and applications

III. Activities and Materials

- A. Text - Cutnell and Johnson -Physics
- B. Classwork
 - 1. Lectures, note-taking discussions, demonstrations, simulations, problem-solving development, graphic analysis, regular tests and quizzes will be utilized.
 - 2. College preparatory skills such as reading, writing, listening, note-taking, problem-solving, information processing, reporting and interpreting, and science-learning skills will be utilized.
- C. Laboratory activities - developing an attitude toward safety
 - 1. Simulations, graphics and vectors
 - 2. Setting-up and handling laboratory apparatus and measurement equipment in all of the major content areas of physics.

3. Studies developing scientific skills and science critical-thinking skills; quantitative relationships; energy studies
 4. Studies of physics principles and their applications related to the course content
 5. Experiments using interfaced computers to gather data and aid in interpretations.
- D. Assignments - to be checked and reviewed by the teacher and students utilizing college preparatory reading, writing, organizational and science process thinking skills and problem-solving techniques and skills.
1. Readings - text and other sources, outlining and the organization of information
 2. Written answers to questions
 3. Problem-solving activities in all content areas
 4. Laboratory and other reports utilizing various techniques and methods
 5. Science study-learning assignments
- E. Students will utilize computer technology in the laboratory setting for data collection and analysis.

IV. Evaluation

- A. Students will be expected to complete classwork and homework learning assignments, laboratory work and reports, and make up work missed whenever it is practical to do so.
- B. Students will be expected to demonstrate a high level of proficiency in all of the goals and objectives of the course within the previously defined content and process areas.
- C. The evaluation of student proficiencies shall consist of tests and quizzes, written assignments and reports, lab reports, and the teacher's regular observations of the student's proficiencies, involvement and learnings in laboratory activities and in the classroom environment.
- D. Students will take a comprehensive final examination. This exam will count as 20% of the final grade.
- E. The final grade represents the teacher's professional judgment of the student's performance and in all of the aforementioned activities.