

## COURSE PROFICIENCY OUTLINE

### PHYSICS - 376

College Prep 5 Credits

#### Purpose

Physics - 376 is offered primarily to seniors following the completion of a middle level chemistry course. Physics concepts are emphasized first. The course emphasizes the key fact that Physics is a science by itself, and not just a branch of applied mathematics. Physics concepts are applied to everyday life. Math equations are used to help apply the Physics concepts. Problem solving will utilize both the Physics concepts and math equations. Thought provoking demonstrations will communicate the Physics concepts clearly to the students. The outcome of the course is that it will broaden the spectrum of science both for the science and non-science oriented student.

#### 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 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 already attained competencies in science critical-thinking skills, study and learning skills, reading, writing, listening and organizing skills, problem-solving skills, and laboratory manipulative and investigative skills and further these college preparatory skills.

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

- 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. Historical work of Copernicus, Galileo, Newton, Maxwell, and Einstein
- B. The Nature of Motion
  - 1. Straight line, curved paths, rotation, oscillations and pendulum motion
  - 2. Newton's Laws and their applications
  - 3. Falling objects
- C. Forces
  - 1. Vector composition and resolution

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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. Conservative forces, simple machines and efficiency
4. Thermodynamic relationships to mechanical energy
5. Isolated systems, outside forces and rotation
6. 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
6. Alternating current, circuits and applications
7. Electronic devices and our changing world

### G. Modern physics principles

1. Nature of matter and of the atom
2. Nucleonics and radioactivity principles and their applications
3. Fission, fusion, alternate energy sources, concepts and applications

## III. Activities and Materials

### A. Text - Paul G. Hewitt - Conceptual Physics - The High School Physics Program

### 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

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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

### 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 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 all of the aforementioned activities and/or requirements are included in the evaluative process.

