Florida Department of Education

COURSE DESCRIPTION - GRADES 9-12, ADULT

Subject Area: Science
Course Number: 2003390
Course Title: Physics I Honors
Credit: 1.0
Will meet graduation requirement for Science

A. **Major Concepts/Content.** The purpose of this course is to provide opportunities to study the concepts, theories, and laws governing the interaction of matter, energy, and forces, and their applications through exploratory investigations and activities.

The content should include, but not be limited to, the following:

- unifying concepts and processes of science
- energy
- force and motion
- dynamics
- wave characteristics
- conservation of energy and momentum
- heat and thermodynamics
- electricity
- magnetism
- interactions among science, technology, and society

This course shall integrate the Goal 3 Student Performance Standards of the Florida System of School Improvement and Accountability as appropriate to the content and processes of the subject matter.

B. **Special Note.** This course shall include laboratory investigations which incorporate the use of measurement, problem solving, laboratory apparatus, safety procedures, and experimental procedures. This course should also include the use of mathematical processes, graphical representation, and data analysis.

Students earning credit in Physics I Honors may not earn credit in Physics I, Principles of Technology I, or Principles of Technology II.

The course requirements for this honors course are consistent with Physics I, Course Number 2003380. The district shall develop a description of additional requirements to provide for in-depth or enriched study of the course requirements.

C. Course Requirements. These requirements include, but are not limited to, the benchmarks from the Sunshine State Standards that are most relevant to this course. Benchmarks correlated with a specific course requirement may also be addressed by other course requirements as appropriate. Some requirements in this course are not fully addressed in the Sunshine State Standards.

Benchmarks from Science, Strand H, should not be taught and assessed in isolation, but should be combined with other benchmarks listed for this course.

After successfully completing this course, the student will:

1. Demonstrate understanding of the unifying concepts and processes of science.

SC.H.1.4.1	know that investigations are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories.
SC.H.1.4.2	know that from time to time, major shifts occur in the scientific view of how the world works, but that more often, the changes that take place in the body of scientific knowledge are small modifications of prior knowledge.
SC.H.1.4.3	understand that no matter how well one theory fits observations, a new theory might fit them as well or better, or might fit a wider range of observations, because in science, the testing, revising, and occasional discarding of theories, new and old, never ends and leads to an increasingly better understanding of how things work in the world, but not to absolute truth.
SC.H.1.4.4	know that scientists in any one research group tend to see things alike and that therefore scientific teams are expected to seek out the possible sources of bias in the design of their investigations and in their data analysis.
SC.H.1.4.5	understand that new ideas in science are limited by the context in which they are conceived, are often rejected by the scientific establishment, sometimes spring from unexpected findings, and usually grow slowly from many contributors.

SC.H.1.4.6	understand that in the short run, new ideas that do not mesh well with mainstream ideas in science often encounter vigorous criticism and that in the long run, theories are judged by how they fit with other theories, the range of observations they explain, how well they explain observations, and how effective they are in predicting new findings.
SC.H.1.4.7	understand the importance of a sense of responsibility, a commitment to peer review, truthful reporting of the methods and outcomes of investigations, and making the public aware of the findings.
SC.H.2.4.1	know that scientists assume that the universe is a vast system in which basic rules exist that may range from very simple to extremely complex but that scientists operate on the belief that the rules can be discovered by careful, systemic study.
SC.H.2.4.2	know that scientists control conditions in order to obtain evidence, but when that is not possible for practical or ethical reasons, they try to observe a wide range of natural occurrences to discern patterns.
SC.H.3.4.1	know that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure.

2. Demonstrate understanding and apply knowledge of wave characteristics, energy, and dynamics.

SC.A.1.4.2	know that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together.
SC.A.1.4.3	know that a change from one phase of matter to another involves a gain or loss of energy.
SC.A.2.4.6	understand that matter may act as a wave, a particle, or something else entirely different with its own characteristic behavior.

3. Demonstrate understanding of forces and motions.

SC.C.1.4.1	know that all motion is relative to whatever frame of reference is chosen and that there is no absolute frame of reference from which to observe all motion.
SC.C.1.4.2	know that any change in velocity is an acceleration.
SC.C.2.4.1	know that acceleration due to gravitational force is proportional to mass and inversely proportional to the square of the distance between the objects.
SC.C.2.4.2	know that electrical forces exist between any two charged objects.

SC.C.2.4.3 describe how magnetic force and electrical force are two aspects of a single force.

SC.C.2.4.4 know that the forces that hold the nucleus of an atom together are much stronger than electromagnetic force and that this is the reason for the great amount of energy released from the nuclear reactions in the sun and other stars.

SC.C.2.4.5 know that most observable forces can be traced to electric forces acting between atoms or molecules.

SC.C.2.4.6 explain that all forces come in pairs commonly called action and reaction.

4. Demonstrate understanding of conservation of energy and momentum.

SC.B.1.4.1 understand how knowledge of energy is fundamental to all the scientific disciplines (e.g., the energy required for biological processes in living organisms and the energy required for the building, erosion, and rebuilding of the Earth).

SC.B.1.4.2 understand that there is conservation of mass and energy when matter is transformed.

5. Demonstrate understanding of interactions of energy and matter.

SC.A.2.4.4 know that nuclear energy is released when small, light atoms are fused into heavier ones.

SC.B.1.4.3 know that temperature is a measure of the average translational kinetic energy of motion of the molecules in an object.

SC.B.1.4.4 know that as electrical charges oscillate, they create time-varying electric and magnetic fields that propagate away from the source as an electromagnetic wave.

SC.B.1.4.6 know that the first law of thermodynamics relates the transfer of energy to the work done and the heat transferred.

SC.B.1.4.7 know that the total amount of usable energy always decreases, even though the total amount of energy is conserved in any transfer.

SC.B.2.4.1 know that the structure of the universe is the result of interactions involving fundamental particles (matter) and basic forces (energy) and that evidence suggests that the universe contains all of the matter and energy that ever existed.

6. Demonstrate understanding of the interactions among science, technology, and society.

SC.B.1.4.5	know that each source of energy presents advantages and disadvantages to its use in society (e.g., political and economic implications may determine a society's selection of renewable or nonrenewable energy sources).
SC.H.3.4.2	know that technological problems often create a demand for new scientific knowledge and that new technologies make it possible for scientists to extend their research in a way that advances science.
SC.H.3.4.3	know that scientists can bring information, insights, and analytical skills to matters of public concern and help people understand the possible causes and effects of events.
SC.H.3.4.4	know that funds for science research come from federal government agencies, industry, and private foundations and that this funding often influences the areas of discovery.
SC.H.3.4.5	know that the value of a technology may differ for different people and at different times.
SC.H.3.4.6	know that scientific knowledge is used by those who engage in design and technology to solve practical problems, taking human values and limitations into account.