



International School

COURSE DESCRIPTION – 8th GRADE

Subject Area: Science
Course Title: Physical Science
Professor: Mr. Jose L. Melendez
Course Length: 1 year

Objective: The purpose of this course is to provide opportunities to study the concepts of matter, energy, and forces of energy through exploratory investigations, activities, and applications.

A. Major Concepts/Content. The content should include, but not be limited to, the following:

- Unifying concepts and processes of science
- Properties and changes of properties of matter
- Motions and forces
- Types of energy and transfer of energy
- Interactions among science, technology, and society

B. Special Note. This course shall include laboratory investigations which incorporate the use of measurement, problem solving, laboratory apparatus, safety procedures, and experimental procedures (e.g., designing, recording, and communicating).

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.

After successfully completing this course, the student will:

1. Conduct safe scientific investigations that demonstrate application of unifying concepts and processes of science and scientific habits of mind.

- Know that scientific knowledge is subject to modification as new information challenges prevailing theories and as a new theory leads to looking at old observations in a new way.
- Know that the study of the events that led scientists to discoveries can provide information about the inquiry process and its effects.

- Know that science disciplines differ from one another in topic, techniques, and outcomes but that they share a common purpose, philosophy, and enterprise.
- Know that accurate record keeping, openness, and replication are essential to maintaining an investigator's credibility with other scientists and society.
- Know that a change in one or more variables may alter the outcome of an investigation.
- Recognize the scientific contributions that are made by individuals of diverse backgrounds, interests, talents, and motivations.
- Know that when similar investigations give different results, the scientific challenge is to verify whether the differences are significant by further study.
- Recognize that patterns exist within and across systems.

2. Demonstrate understanding of the properties and changes of properties in matter.

- Identify various ways in which substances differ (e.g., mass, volume, shape, density, texture, and reaction to temperature and light).
- Understand the difference between weight and mass.
- Know that temperature measures the average energy of motion of the particles that make up the substance.
- Know that atoms in solids are close together and do not move around easily; in liquids, atoms tend to move farther apart; in gas, atoms are quite far apart and move around freely.
- Know the difference between a physical change in a substance (i.e., altering the shape, form, volume, or density) and a chemical change (i.e., producing new substances with different characteristics).
- Know that equal volumes of different substances may have different masses.
- Know the general properties of the atom (a massive nucleus of neutral neutrons and positive protons surrounded by a cloud of negative electrons) and accept that single atoms are not visible.

3. Demonstrate knowledge of the transfer of energy.

- Describe and compare the properties of particles and waves.

- Know that radiation, light, and heat are forms of energy used to cook food, treat diseases, and provide energy.
- Identify forms of energy and explain that they can be measured and compared.
- Know that energy cannot be created or destroyed, but only changed from one form to another.
- Know the various forms in which energy comes to Earth from the Sun (e.g., visible light, infrared, and microwave).
- Know that energy conversions are never 100% efficient (i.e., some energy is transformed to heat and is unavailable for further useful work).
- Know the processes by which thermal energy tends to flow from a system of higher temperature to a system of lower temperature.
- Know the properties of waves (e.g., frequency, wavelength, and amplitude); that each wave consists of a number of crests and troughs; and the effects of different media on waves.
- Know that most events in the universe (e.g., weather changes, moving cars, and the transfer of a nervous impulse in the human body) involve some form of energy transfer and that these changes almost always increase the total disorder of the system and its surroundings, reducing the amount of useful energy.
- Know that most of the energy used today is derived from burning stored energy collected by organisms millions of years ago (i.e., nonrenewable fossil fuels).
- Know that vibrations in materials set up wave disturbances that spread away from the source (e.g., sound and earthquake waves).

4. Demonstrate understanding of forces and motion.

- Know that the motion of an object can be described by its position, direction of motion, and speed.
- Know that vibrations in materials set up wave disturbances that spread away from the source (e.g., sound and earthquake waves).
- Know that many forces (e.g., gravitational, electrical, and magnetic) act at a distance (i.e., without contact).
- Know common contact forces.

- Know that if more than one force acts on an object, then the forces can reinforce or cancel each other, depending on their direction and magnitude.
- Know that simple machines can be used to change the direction or size of a force.
- Understand that an object in motion will continue at a constant speed and in a straight line until acted upon by a force and that an object at rest will remain at rest until acted upon by a force.
- Explain and show the ways in which a net force (i.e., the sum of all acting forces) can act on an object (e.g., speeding up an object traveling in the same direction as the net force, slowing down an object traveling in the direction opposite of the net force).
- Know that gravity is a universal force that every mass exerts on every other mass.

5. Describe how the physical sciences interact with technology and society.

- Know that some resources are renewable and others are nonrenewable.
- Know that a brief change in the limited resources of an ecosystem may alter the size of a population or the average size of individual organisms and that long-term change may result in the elimination of animal and plant populations inhabiting the Earth.
- Understand that humans are a part of an ecosystem and their activities may deliberately or inadvertently alter the equilibrium in ecosystems.
- Know that science ethics demand that scientists must not knowingly subject coworkers, students, the neighborhood, or the community to health or property risks.
- Know that in research involving human subjects, the ethics of science require that potential subjects be fully informed about the risks and benefits associated with the research and of their right to refuse to participate.
- Know that technological design should require taking into account constraints such as natural laws, the properties of the materials used, and economic, political, social, ethical, and aesthetic values.
- Know that no matter who does science and mathematics or invents things, or when or where they do it, the knowledge and technology that result can eventually become available to everyone.
- Know that computers speed up and extend people's ability to collect, sort, and analyze data; prepare research reports; and share data and ideas with others.