

Saddlebrook Preparatory School
Course Description
Physical Science

Course Standards

The Nature of Matter

The students will understand that all matter has observable, measurable properties.

- know that the electron configuration in atoms determines how a substance reacts and how much energy is involved in its reactions.
- know that the vast diversity of the properties of materials is primarily due to variations in the forces that hold molecules together.
- know that a change from one phase of matter to another involves a gain or loss of energy.
- experiment and determine that the rates of reaction among atoms and molecules depend on the concentration, pressure, and temperature of the reactants and the presence or absence of catalysts.
- know that connections (bonds) form between substances when outer-shell electrons are either transferred or shared between their atoms, changing the properties of substances.

The students will understand the basic principles of atomic theory.

- know that the number and configuration of electrons will equal the number of protons in an electrically neutral atom and when an atom gains or loses electrons, the charge is unbalanced.
- know the difference between an element, a molecule, and a compound.
- know that a number of elements have heavier, unstable nuclei that decay, spontaneously giving off smaller particles and waves that result in a small loss of mass and release a large amount of energy.
- know that elements are arranged into groups and families based on similarities in electron structure and that their physical and chemical properties can be predicted.
- understand that matter may act as a wave, a particle, or something else entirely different with its own characteristic behavior.

Energy

The students will recognize that energy may be changed in form with varying efficiency.

- understand that there is conservation of mass and energy when matter is transformed.
- know that temperature is a measure of the average translational kinetic energy of motion of the molecules in an object.
- know that the total amount of usable energy always decreases, even though the total amount of energy is conserved in any transfer.

The students will understand the interaction of matter and energy.

- 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.

Force and Motion

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The students will understand that types of motion may be described, measured, and predicted.

- 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.
- know that any change in velocity is an acceleration.

The students will understand that the types of force that act on an object and the effect of that force can be described, measured, and predicted.

- know that acceleration due to gravitational force is proportional to mass and inversely proportional to the square of the distance between the objects.
- know that electrical forces exist between any two charged objects.
- describe how magnetic force and electrical force are two aspects of a single force.
- 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.
- know that most observable forces can be traced to electric forces acting between atoms or molecules.
- explain that all forces come in pairs commonly called action and reaction.

Processes that Shape the Earth

The students will understand the need for protection of the natural systems on Earth.

- understand the interconnectedness of systems on Earth and the quality of life.

The Nature of Science

The students will use the scientific process and habits of mind to solve problems.

- 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.
- 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.
- 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.
- 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.
- 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.
- 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,

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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.

- 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.

The students will understand that most natural events occur in comprehensible, consistent patterns.

- 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.
- 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.

The students will understand that science, technology, and society are interwoven and interdependent.

- know that performance testing is often conducted using small-scale models, computer simulations, or analogous systems to reduce the chance of system failure.
- 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.
- know that scientists can bring information, insights, and analytical skills to matter of public concern and help people understand the possible causes and effects of events.
- 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.
- know that the value of a technology may differ for different people and at different times.
- 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.

ESOL Modifications at Saddlebrook Preparatory:

- small group and one on one ESOL instruction and content support from ESOL teacher.
- extended time on assignments and assessments.
- use of bilingual dictionary or glossary where appropriate (i.e.: not on a definitions test)
- content read and reworded, adapted to the student's proficiency level.
- questions read and reworded

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- separate testing location
- proficiency level taken into account on assessment of grammar and mechanics on written assignments, however progress is expected over the course of the year.