Science Program Philosophy

The guiding principle of the science curriculum is to develop lifelong, active scientifically literate students who can function as critical scientific citizens in a local and global community.

Through a cohesive, well-articulated curriculum, the students will understand and value the significance of the scientific method in problem solving.

The students will appreciate that science, historically, is a human endeavor and that many individuals and cultures have contributed and continue to contribute to the technological advancement of ideas and multi-faceted processes.

Science Program Goals

Students will:

- understand and apply basic concepts, principles, and theories of biology, chemistry, physics, earth (including ecology) and space sciences and their interrelationships;

- use inquiry skills to recognize a problem, and through the use of the scientific method, search for possible solutions and evaluate the results obtained;

- demonstrate a knowledge of scientific concepts and new scientific developments that lead to a greater understanding of the world;

- develop work habits that enable them to select and properly use appropriate laboratory technology, equipment and materials, including measuring and sensing devices;

- understand and use, when appropriate, existing and merging technologies which have an effect on society and our quality of life, including personal, academic and work environments;

- analyze the possibilities and limits of science and technology in order to make and defend decisions about societal issues and the consequences of personal actions as they relate to the physical and biological world; and

- understand that the way in which scientific knowledge is formulated is crucial to the validity of that knowledge.

Hallmarks of Best Practice in Science

Increase	Decrease
In-depth study of topics in each science field, in which students discover the fundamental concepts of science	Cursory coverage of a lock-step curriculum that includes everything but allows no time for deeper understanding of topics
Emphasis on activities that engage students in inquiry and problem-solving about significant scientific issues	Memorization of isolated facts in textbooks
Student's decision-making and participation in societal scientific issues so that they share a sense of responsibility for our physical and biological world	Classroom isolation from real-life applications and issues
Participation in interactive and co-operative classroom study processes for students at all ability levels	Lecture classes in which students sit passively; classes in which students of lower ability have fewer opportunities than other students
Study of concrete, scientific principles at the elementary level to develop greater understanding of the scientific process at the secondary level	Introduction of developmentally inappropriate, abstract and complex concepts at the elementary level
Study of richer content with concepts from life, physical and earth sciences	Assumption that students are less interested in issues related to all the sciences
Students' inquiry about natural phenomenon which they observe in their environment	Use of curriculum that leaves students disconnected from, and unexcited about scientific topics
Formative and summative evaluation that involves systematic observation, experimentation and analysis that assesses the understanding of our physical world	Assessments only at the end of a unit or grading period; assessments that test only factual knowledge or memorization of textbook information

Science Essential Understandings

1. *Nature of Science:* The application of the scientific method promotes an orderly process of scientific inquiry, which is universally recognized by the scientific community.

2. *History of Science:* The contributions of scientists throughout history have advanced our knowledge of the universe.

3. *Science and Technology:* Technology and scientific reasoning need to be analyzed for their benefits as well as their consequences, including their impact on social morays.

4. *Astronomy:* The universe is an interactive, constantly changing and expanding system of galaxies, stars and planets.

5. *Geology and Natural Resources:* The earth consists of organic and inorganic materials that are necessary for human survival and scientists study these materials to properly manage and protect them.

6. *Oceanography:* The ocean is a complex system of living organisms and chemicals that are necessary for human survival and therefore must be explored by scientists in order to properly manage and protect it.

7. *Meteorology:* Weather and climate impact human activities and scientists regularly measure and monitor these phenomenons in order to predict future patterns.

8. *Earth History and Dynamics:* The earth is a dynamic and interactive body that is constantly undergoing physical and chemical changes that significantly affect the life forms it supports.

9. *Characteristics of Living Things:* All living things share common characteristics that allow them to perform life functions and processes, which enable them to adapt to their environment.

10. *Cells, Genetics and Evolution:* Life is dependent on cells and these cells are the controlling factors of the past, present and future of all living things.

11. *Ecosystems:* Living things interact with their biotic and abiotic components of their environment.

12. *Human Biology:* Humans and other living things contain systems that enable them to sustain basic life processes.

13. *Issues in Bioethics:* New scientific discoveries and advancements can be beneficial or problematic for all life forms.

14. *Structure of Matter:* The physical world contains basic elements whose structure can be studied.

15. *Reactions and Interactions:* Matter is transformed in accordance with various chemical laws and principles.

16. *Force and Motion:* The universe, as well as the physical world and everything in it, can be ultimately explained and understood through physical theories and laws of force and motion.

17. *Energy Sources and Transformations:* Energy is a fundamental part of all physical and chemical changes.

18. *Heat and Temperature:* Heat is one of the fundamental forms of energy affecting change and order of matter in our universe.

19. *Magnetism and Electricity:* The interrelationship of magnetism and electricity is the basis for modern electronic technologies.

20. *Sound and Light:* Properties and interactions of waves demonstrate the relationship between energy, sound and light.

CONTENT STANDARDS AND RELATED ESSENTIAL UNDERSTANDINGS

1. Scientific Reasoning and Communication

- *Nature of Science*: The application of the scientific method promotes an orderly process of scientific inquiry, which is universally recognized by the scientific community.
- *History of Science*: The contributions of scientists throughout history have advanced our knowledge of the universe.
- *Science and Technology*: Technology and scientific reasoning need to be analyzed for their benefits as well as their consequences, including their impact on social morays.
- *Issues in Bioethics*: New scientific discoveries and advancements can be beneficial or problematic for all life forms.

2. Physical Science

- *Structure of Matter:* The physical world contains basic elements whose structure can be studied.
- *Reactions and Interactions:* Matter is transformed in accordance with various chemical laws and principles.
- *Force and Motion:* The universe, as well as the physical world and everything in it, can be ultimately explained and understood through physical theories and laws of force and motion.
- *Energy Sources and Transformations:* Energy is a fundamental part of all physical and chemical changes.
- *Heat and Temperature:* Heat is one of the fundamental forms of energy affecting change and order of matter in our universe.
- *Magnetism and Electricity:* The interrelationship of magnetism and electricity is the basis for modern electronic technologies.
- *Sound and Light:* Properties and interactions of waves demonstrate the relationship between energy, sound, and light.

3. Life Science

- *Oceanography:* The ocean is a complex system of living organisms and chemicals that are necessary for human survival and therefore must be explored by scientists in order to properly manage and protect it.
- *Characteristics of Living Things:* All living things share common characteristics that allow them to perform life functions and processes, which enable them to adapt to their environment.
- *Cells, Genetics, and Evolution:* Life is dependent on cells and these cells are the controlling factors of the past, present and future of all living things.
- *Ecosystems:* Living things interact with their biotic and abiotic components of their environment.
- *Human Biology:* Humans and other living things contain systems that enable them to sustain basic life processes.

4. Earth Science

- *Astronomy:* The universe is an interactive, constantly changing and expanding system of galaxies, stars, and planets.
- *Geology and Natural Resources:* The earth consists of organic and inorganic materials that are necessary for human survival and scientists study these materials to properly manage and protect them.
- *Meteorology:* Weather and climate impact human activities and scientists regularly measure and monitor these phenomenons in order to predict future patterns.
- *Earth History and Dynamics:* The earth is a dynamic and interactive body that is constantly undergoing physical and chemical changes that significantly affect the life forms it supports.