

# SCIENCE

The K-12 Science Competency Based Curriculum (CBC) has been revised to incorporate Florida’s Sunshine State Standards for Science and the content standards of the National Science Education Standards. The incorporation of both state and national standards has necessitated a revision of the K-12 Competency Based Curriculum for Science. The goal of the local, state, and national standards is to develop a scientifically literate citizenry with standards for all students. Standards for all students embody both excellence and equity. Different students will achieve understanding in different ways, and different students will achieve different degrees of depth and breadth of understanding.

The Science CBC will require changes in how science education is implemented. Learning science is an active process, something that students do, not something that is done to them. “Hands-on” activities, while essential, are not enough. Students must have “minds-on” experiences as well.

The K-8 Science CBC is organized into seven components:

- I. The Nature of Science as Inquiry**
- II. Life Science**
- III. Earth and Space Science**
- IV. Physical Science**
- V. Science and Technology Design**
- VI. Interaction of Society and the Environment**
- VII. Comprehensive Health**

The following synopses to each of the seven components will provide insight into the unity of purpose and vision necessary to implement the curriculum adapted from the National Science Education Standards and the Sunshine State Standards for science.

## ***Component I - The Nature of Science as Inquiry***

From the earliest grades, students should experience science in a form that engages them in the active construction of ideas and explanations that enhance their opportunities to develop the abilities of doing science. In the early years of school, students develop inquiry skills. As students focus on the processes of doing investigations, they develop the ability to ask scientific questions, investigate aspects of the world around them, and use their observations to construct reasonable explanations for the questions posed. In middle school,

full inquiry involves asking a simple question, completing an investigation, answering the question, and presenting the results to others. In grades 9-12, students learn how to analyze and interpret evidence and data from their own investigations through the use of databases, plotting data, developing mathematical functions and determining the mean, median, and mode values as well as analysis of variance.

## ***Component II - Life Science***

Students’ ideas about the characteristics of organisms develop from basic concepts of living and nonliving. Students build understandings of biological concepts through direct experience with living things, their life cycles, and their habitats. Because the elementary student’s world is closely associated with the home, school, and immediate environment, the study of organisms should include observations and interactions within the natural world. As students progress into the middle school level, their ability to acquire additional information and understand more complex ideas enables students to progress from studying life science from the point of view of individual organisms to relating structure and function, recognizing patterns in ecosystems, and developing understandings about the cellular dimensions of living systems. At the high school level, the molecular, chemical, evolutionary and behavioral aspects of living things are addressed with respect to matter, energy, and organization in living systems.

## ***Component III - Earth and Space Sciences***

During the first years of school, students should be encouraged to closely observe the objects and materials in their environment, note their properties, distinguish one from another, and develop their own explanations of how things become the way they are. Middle school students will concentrate on recognizing the four major components of the earth system and how these components are related to physical, chemical, and biological processes. At the high school level, there is a much greater emphasis on energy in the earth system, geochemical cycles, origin and evolution of the earth system, and the universe.

## ***Component IV - Physical Science***

Young students should begin their study of matter by examining and qualita-

tively describing objects and their behavior. By recording data and making graphs and charts, older children can search for patterns and order in their work and that of their peers. In grades 6-8, students observe and measure characteristic properties and use those properties to distinguish and separate one substance from another. In grades 9-12, the structure of atoms, the structure and properties of matter, chemical reactions, motions and forces, conservation of energy, and increase in disorder and the interactions of energy and matter are addressed in greater depth through quantitative analysis and formulation of concepts in quantifiable form.

#### ***Component V - Interaction of Society and the Environment***

Students in elementary school should have a variety of experiences that provide initial understandings for various science-related personal and societal challenges. Central ideas related to populations, resources, and environments provide the foundations for students' eventual understandings and actions as citizens. As students expand their conceptual horizons across grades K-12, they will eventually develop a view that is not centered exclusively on humans and begin to recognize that individual actions accumulate into societal actions. Eventually, students must recognize that society cannot afford to deal only with symptoms: The causes of the problems must be the focus of personal and societal actions.

#### ***Component VI - Science and Technology Design***

The science and technology components connect students to the designed world, offer them experience in making models of useful things, and introduce them to laws of nature through their understanding of how technological objects and systems work. This component helps establish design as the technological parallel to inquiry in science. Students in grades 6-8 can begin to differentiate between science and technology. The understanding of technology can be developed by tasks in which students have to design something and also by studying technological products and systems. In grades 9-12, students should be able to identify a problem and design an opportunity, propose designs and choose between alternative solutions, implement a proposed solution, evaluate the solution and its consequences, and communicate the problem, process, and solution.

#### ***Component VII - Comprehensive Health***

Grade K-5 students exhibit little understanding of ideas such as nutrition, health, different origins of disease, resistance to infection, and prevention and cure of disease. They need to concentrate on observing, and collecting information through simple investigations as described in component I. By middle school, students begin to realize that illness can be caused by various factors. By grades 9-12, students should have a good general understanding of population growth in relation to the use of natural resources and environmental quality, be familiar with natural and human induced hazards, and explain the effects of science and technology on a local, national and global scale.