CONTENT STANDARDS

The SpaceOLÉ curriculum supports several National Science Education Standards. Each Challenge Card at the ***Discovery*** and ***Voyager*** levels, for example, indicates the NSES content standards addressed by the challenge question. At the ***Explorer*** level, students develop their own questions, and each card includes a space where they may indicate the content standards addressed by the question.

The expanded text for content standards addressed by SpaceOLÉ is included below for the convenience of teachers as well as students.

NATIONAL SCIENCE EDUCATION STANDARDS

CONTENT STANDARD D:
EARTH AND SPACE SCIENCE

D1. ENERGY IN THE EARTH SYSTEM
The Earth has internal and external sources of energy. The Earth's internal energy drives mantle convection cells that move crustal plates on the Earth's surface. Global climate is a function of heat transfer from the Sun and near the Earth's surface.

D2. GEOCHEMICAL CYCLES:
The Earth contains a fixed amount of each stable chemical atom or element, and the elements move through geochemical cycles. These cycles are driven by the Earth's internal and external sources of energy.

D3. ORIGIN AND EVOLUTION OF THE EARTH SYSTEM
The solar system formed from a nebular cloud of dust and gas 4.6 billion years ago. The Earth has evolved through interactions of the solid Earth, oceans, atmosphere, and changing life. Correlating rock sequences, fossils, and radioactive isotope decay can estimate geologic time.

D4. ORIGIN AND EVOLUTION OF THE UNIVERSE
Our solar system formed from a cloud of dust and gas 4.6 billion years ago. The universe began earlier, possibly in the "Big Bang."

CONTENT STANDARD E:
SCIENCE AND TECHNOLOGY

E1. ABILITIES OF TECHNOLOGICAL DESIGN

IDENTIFY A PROBLEM OR DESIGN AN OPPORTUNITY. Students should be able to identify new problems or needs and to change and improve current technological designs.

PROPOSE DESIGNS AND CHOOSE BETWEEN ALTERNATIVE SOLUTIONS. Students should demonstrate thoughtful planning for a piece of technology or technique. Students should be introduced to the roles of models and simulations in these processes.

IMPLEMENT A PROPOSED SOLUTION. A variety of skills can be needed in proposing a solution depending on the type of technology that is involved. The construction of artifacts can require the skills of cutting, shaping, treating, and joining common materials--such as wood, metal, plastics, and textiles. Solutions can also be implemented using computer software.

EVALUATE THE SOLUTION AND ITS CONSEQUENCES. Students should test any solution against the needs and criteria it was designed to meet. At this stage, new criteria not originally considered may be reviewed.

COMMUNICATE THE PROBLEM, PROCESS, AND SOLUTION. Students should present their results to students, teachers, and others in a variety of ways, such as orally, in writing, and in other forms--including models, diagrams, and demonstrations.

CONTENT STANDARD F:
SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

F1. PERSONAL AND COMMUNITY HEALTH
Hazards and the potential for accidents exist. Regardless of the environment, the possibility of injury, illness, disability, or death may be present. Humans have a variety of mechanisms--sensory, motor, emotional, social, and technological--that can reduce and modify hazards.

F3. NATURAL RESOURCES
Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to be used to maintain human populations.

The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources, and it depletes those resources that cannot be renewed.

Humans use many natural systems as resources. Natural systems have the capacity to reuse waste, but that capacity is limited. Natural systems can change to an extent that exceeds the limits of organisms to adapt naturally or humans to adapt technologically.

F4. ENVIRONMENTAL QUALITY
Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients. Humans are changing many of these basic processes, and the changes may be detrimental to humans.

Materials from human societies affect both physical and chemical cycles of the earth.

Many factors influence environmental quality. Factors that students might investigate include population growth, resource use, population distribution, overconsumption, the capacity of technology to solve problems, poverty, the role of economic, political, and religious views, and different ways humans view the earth.

F5. NATURAL AND HUMAN-INDUCED HAZARDS
Normal adjustments of earth may be hazardous for humans. Humans live at the interface between the atmosphere driven by solar energy and the upper mantle where convection creates changes in the earth's solid crust. As societies have grown, become stable, and come to value aspects of the environment, vulnerability to natural processes of change has increased.

Human activities can enhance potential for hazards. Acquisition of resources, urban growth, and waste disposal can accelerate rates of natural change.

Some hazards, such as earthquakes, volcanic eruptions, and severe weather, are rapid and spectacular. But there are slow and progressive changes that also result in problems for individuals and societies. For example, change in stream channel position, erosion of bridge foundations, sedimentation in lakes and harbors, coastal erosions, and continuing erosion and wasting of soil and landscapes can all negatively affect society.

Natural and human-induced hazards present the need for humans to assess potential danger and risk. Many changes in the environment designed by humans bring benefits to society, as well as cause risks. Students should understand the costs and trade-offs of various hazards–ranging from those with minor risk to a few people to major catastrophes with major risk to many people. The scale of events and the accuracy with which scientists and engineers can (and cannot) predict events are important considerations.

F6. SCIENCE AND TECHNOLOGY IN LOCAL, NATIONAL, AND GLOBAL CHALLENGES

Science and technology are essential social enterprises, but alone they can only indicate what can happen, not what should happen. The latter involves human decisions about the use of knowledge.

Understanding basic concepts and principles of science and technology should precede active debate about the economics, policies, politics, and ethics of various science- and technology-related challenges. However, understanding science alone will not resolve local, national, or global challenges.

Individuals and society must decide on proposals involving new research and the introduction of new technologies into society. Decisions involve assessment of alternatives, risks, costs, and benefits and consideration of who benefits and who suffers, who pays and gains, and what the risks are and who bears them. Students should understand the appropriateness and value of basic questions–"What can happen?"–"What are the odds?"–and "How do scientists and engineers know what will happen?"

Humans have a major effect on other species. For example, the influence of humans on other organisms occurs through land use--which decreases space available to other species–and pollution–which changes the chemical composition of air, soil, and water.