INTRODUCTION

The Hinsdale School District PreK-12 science curriculum is a coordinated program built around science education and the expectations of the New Hampshire Curriculum Frameworks. It proceeds sequentially; introducing, expanding, and further exploring content at appropriate grade levels with increasing degrees of depth and complexity. The Common Core State Standards for English Language Arts include standards pertaining to all content areas. **Teachers are responsible for incorporating the Common Core State Standards into their science instruction.**

IMPORTANT NOTE TO ALL TEACHERS

It is important for teachers to follow the curriculum for each grade level or class as described in this guide; the integrity of the PreK-12 sequence has been carefully considered in its creation. Grade levels and individual classes have some degree of flexibility in designing the sequence of topics through the year, but *addressing the provided scope is required*. At the elementary level, the topics for each grade level have been carefully planned so as to address necessary content without redundancy or omission to meet the expectations of the NH frameworks and high stakes testing. At the middle school and high school levels the curricula are also constructed to fully meet the expectations of the NH frameworks and high stakes testing. The guiding questions in each section make clear the topics of inquiry (scope) for each grade. These topics change and build on each other through the grades (sequence), making it imperative that each teacher use the guiding questions to plan instruction.

SCIENCE INQUIRY

Capture student interest and motivate continued learning!

Inquiry involves QUESTIONING. Inquiry requires being able to identify assumptions, to use critical and logical thinking, and the ability to consider alternative explanations. Inquiry might be highly structured where known outcomes are clear, or students may be free to explore with unanticipated results!

Students engaged in Inquiry:

- make observations
- pose questions
- propose answers
- examine what they may already know
- review already researched information
- explain / communicate results
- use tools to
    - gather
    - analyze
    - interpret data

Students use journals to record observations, thoughts, ideas, and models, create diagrams, and represent data and observations with plots and tables. Students present their work to others with models, graphs, reports, posters, etc.
Asking students questions to guide continued exploration provides opportunities for discussion, further reflection, and student decision-making.
Appropriate activities are safe, developmentally appropriate, and directly related to the curriculum. Sufficient tools and materials must be available and science inquiry vocabulary (provided in guide) used.

Essential Understandings

The Science Curriculum for Hinsdale Elementary, Middle and High School is built around the standards listed in the New Hampshire Curriculum Framework. Science is divided into three content domains (Earth Space Science, Life Science, and Physical Science) and one Science Process Skills domain. The three content domains should encompass the Scientific Process Skills of Inquiry and Critical Thinking Skills. The following list of Essential Understandings or Enduring Knowledge Statements are used across all grade levels.

Essential Understandings
Earth Space Science

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
ESS1– The Earth and Earth materials, as we know them today, have developed over long periods of time, through constant change processes.	1. Atmosphere, Climate, and Weather
	2. Composition and Features
	3. Fossils
	4. Observation Of The Earth From Space
	5. Processes and Rates Of Change
	6. Rock Cycle
	7. Water
ESS2– The Earth is part of a solar system, made up of distinct parts, which have temporal and spatial interrelationships.	1. Earth, Sun And Moon
	2. Energy
	3. Solar System
	4. View From Earth
ESS3– The origin and evolution of galaxies and the universe demonstrate fundamental principles of physical science across vast distances and time.	1. Size And Scale
	2. Stars And Galaxies
	3. Universe
ESS4– The growth of scientific knowledge in Earth Space Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology
	2. Tools
	3. Local And Global Environmental Issues
	4. Career and Technical Education

(NH Department of Education- NH Curriculum Framework 2006)

Essential Understandings
Life Science

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
LS1– All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, and species).	1. Classification
	2. Living Things And Organization
	3. Reproduction
LS2– Energy flows and matter recycles through an ecosystem.	1. Environment
	2. Flow Of Energy
	3. Recycling Of Materials
LS3– Groups of organisms show evidence of change over time (e.g. evolution, natural selection, structures, behaviors, and biochemistry).	1. Change
	2. Evolution
	3. Natural Selection
LS4– Humans are similar to other species in many ways, and yet are unique among Earth's life forms.	1. Behavior
	2. Disease
	3. Human Identity
LS5– The growth of scientific knowledge in Life Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology
	2. Tools
	3. Social Issues (Local And Global) Medical Technology and Biotechnology
	4. Career Technical Education Connections

(NH Department of Education- NH Curriculum Framework 2006)

Essential Understandings
Physical Science

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
PS1– All living and nonliving things are composed of matter having characteristic properties that distinguish one substance from another (independent of size/amount of substance).	1. Composition
	2. Properties
PS2– Energy is necessary for change to occur in matter. Energy can be stored, transferred and transformed, but cannot be destroyed.	1. Change
	2. Conservation
	3. Energy
PS3– The motion of an object is affected by force.	1. Forces
	2. Motion
PS4– The growth of scientific knowledge in Physical Science has been advanced through the development of technology and is used (alone or in combination with other sciences) to identify, understand and solve local and global issues.	1. Design Technology
	2. Tools
	3. Social Issues (Local and Global) Energy, Power, and Transportation Manufacturing
	4. Career Technical Education Connections

(NH Department of Education- NH Curriculum Framework 2006)

Essential Understandings
Science Process Skills

Strand (Enduring Knowledge Statements)	Stem (rows) in GSEs
SPS1– Scientific Inquiry and Critical Thinking Skills	1. Making observations and asking questions
	2. Designing scientific investigations
	3. Conducting scientific investigations
	4. Representing and Understanding results of Investigations
	5. Evaluating Scientific Investigations
	NECAP Science Assessment Targets for Inquiry (INQ) *May subject of performance component*
SPS2– Unifying Concepts of Science (including NECAP Science Assessment Targets by Big Idea)	1. Nature of Science (NOS)
	2. Systems and Energy (SAE)
	3. Models and Scale (MAS)
	4. Patterns of Change (POC)
	5. Form and Function (FAF)
SPS3– Personal, Social, and Technological Perspectives	1. Collaboration in Scientific Endeavors
	2. Environment, Natural Resources, and Conservation
	3. Science, Technology, and Design
SPS4– Science Skills for Information, Communication and Media Literacy	1. Information and Media Literacy
	2. Communication Skills
	3. Critical Thinking and Systems Thinking
	4. Problem Identification, Formulation, and Solution
	5. Creativity and Intellectual Curiosity
	6. Interpersonal and Collaborative Skills
	7. Self Direction
	8. Accountability and Adaptability
	9. Social Responsibility

(NH Department of Education- NH Curriculum Framework 2006)

GRADE: 9

Earth Science

	Standards	Guiding Questions
ESS1	S:ESS1:11:3.2 Relate how geologic time is determined using various dating methods (e.g., radioactive, decay, rock sequences, fossil records). S:ESS1:11:4.1 Provided with geologic data (including movement of plates) on a given locale, predict the likelihood for an earth event (e.g. volcanoes mountain ranges, islands, earthquakes, tides, tsunamis). S:ESS1:11:5.4 Provide supporting geologic/geographic evidence that supports the validity of the theory of plate tectonics. S:ESS1:11:5.5 Trace the development of the theory of plate tectonics. S:ESS1:11:5.6 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).	What is geologic time? How can the age of a fossil be determined? Can scientists predict earthquakes and volcanic eruptions? How can we explain the ongoing changes of the Earth surface?
ESS2	S:ESS2:11:2.3 Explain how internal and external sources of heat (energy) fuel geologic processes (e.g., rock cycle, plate tectonics, sea floor spreading).	What makes the Earth's plates move?
ESS3	S:ESS3:11:2.3 Explain the relationships between or among the energy produced from nuclear reactions, the origin of elements, and the life cycles of stars.	What is nuclear energy? What happens when an atom breaks apart? What makes an element different from another?

GRADE: 9

Earth Science

	S:ESS3:11:3.3 Provide scientific evidence that supports or refutes the "Big Bang" theory of how the universe was formed. S:ESS3:11:3.4 Based on the nature of electromagnetic waves, explain the movement and location of objects in the universe or their composition (e.g., red shift, blue shift, line spectra). S:ES3:11:3.5 Explain how scientific theories about the structure of the universe have been advanced through the use of sophisticated technology (e.g., space probes; visual, radio and x-ray telescopes).	How are elements formed inside stars? How do we know how old is the Universe?
ESS4	S:ESS4:11:1.1 Describe ways in which technology has increased our understanding of the universe. S:ESS4:11:2.1 Describe the use and benefits of land-based light telescopes, radio telescopes, spectrophotometers, satellites, manned exploration, probes, and robots to the study of Earth Space Science. S:ESS4:11:2.2 Explain how scientists study the Earth using computer-generated models and observations from both land-based sites and satellites; and describe the value of using these tools in unison. S:ESS4:11:4.1 Explain the kinds of applications of knowledge and skills necessary for jobs/careers specific to Earth or space sciences.	What are the different types of telescopes? Why do some telescopes need to be located outside the Earth's atmosphere? How has the use of computers improved our knowledge of the Universe? What are the different careers in Earth Science?

GRADE: 9

Earth Science

Essential Vocabulary

CONTENT	INQUIRY
Heat	Describe
Energy	Differentiate
Weather	Use evidence
Climate	Support
Precipitation	Explain
Atmosphere	Make and support an inference
Element	Explain processes
Geochemical Cycle	Compare and contrast
Plate tectonics	Re-evaluate
Crustal plates	Describe
Fossil	Identify
Radioactive dating	Differentiate
Volcano	Recognize
Mountain range	Explain
Earthquake	Justify
Tsunami	Evidence
Island	Interrelations
Tide	Interdependence
Crust	Inquiry
Mantle	Scientific method
Core	Observation
Solar radiation	Hypothesis
Rock cycle	Prediction
Igneous	Variable
Metamorphic and Sedimentary	Experiment
Gravitational force	Data
Electromagnetic waves	Measurement
Big bang	Analyze
	Conclude
	Graph

GRADE: 9

Earth Science

Suggested Resources/ Activities

Exploring Earth:
http://www.classzone.com/books/earth_science/terc/navigation/home.cfm

NASA. http://www.nasa.gov/audience/forstudents/9-12/index.html

NOAA http://www.education.noaa.gov/

http://www.education.nh.gov/instruction/curriculum/science/index.htm
(Science Curriculum Website)

http://www.education.nh.gov/instruction/assessment/necap/released/index.htm
(Science NECAP- Released items)