

GENERAL SCIENCE I – EARTH AND FORCES  
2009

**COURSE DESCRIPTION:**

This course will cover topics in both physics and earth science. The physics component will include the concepts of speed, velocity, momentum and acceleration along with Newton's Laws of Motion and forces. The study of waves and wave motion will be directly tied into the study of the earth's interior and earthquakes during the earth science component of the course. The earth science component will include the study of the earth's interior, plate tectonics, volcanoes, earthquakes, atmosphere, weather and the solar system.

**CORE CURRICULUM CONTENT STANDARDS:**

STANDARD 5.1 (Scientific Processes) All students will develop problem-solving, decision-making and inquiry skills, reflected by formulating usable questions and hypotheses, planning experiments, conducting systematic observations, interpreting and analyzing data, drawing conclusions, and communicating results.

**A. Habits of Mind**

**B. Inquiry and Problem Solving**

**C. Safety**

STANDARD 5.2 (Science and Society) All students will develop an understanding of how people of various cultures have contributed to the advancement of science and technology, and how major discoveries and events have advanced science and technology.

**A. Cultural Contributions**

**B. Historical Perspectives**

STANDARD 5.3 (Mathematical Applications) All students will integrate mathematics as a tool for problem-solving in science, and as a means of expressing and/or modeling scientific theories.

**A. Numerical Operations**

**B. Geometry and Measurement**

**C. Patterns and Algebra**

**D. Data Analysis and Probability**

STANDARD 5.4 (Nature and Process of Technology) All students will understand the interrelationships between science and technology and develop a conceptual understanding of the nature and process of technology.

**A. Science and Technology**

**B. Nature of Technology**

**C. Technological Design**

STANDARD 5.7 (Physics) All students will gain an understanding of natural laws as they apply to motion, forces, and energy transformations.

**A. Motion and Forces**

**B. Energy Transformations**

STANDARD 5.8 (Earth Science) All students will gain an understanding of the structure, dynamics, and geophysical systems of the earth.

**A. Earth's Properties and Materials**

**B. Atmosphere and Weather**

**C. Processes that Shape the Earth**

**D. How We Study the Earth**

STANDARD 5.9 (Astronomy & Space Science) All students will gain an understanding of the origin, evolution, and structure of the universe.

**A. Earth, Moon, Sun System**

**B. Solar System**

**C. Stars**

**D. Galaxies and Universe**

STANDARD 5.10 (Environmental Studies) All students will develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena.

**A. Natural Systems and Interactions**

**B. Human Interactions and Impact**

STANDARD 8.1 (Computer and information literacy) All students will use computer applications to gather and organize information and to solve problems.

**A. Basic Computer Skills and Tools**

**B. Application of Productivity Tools**

STANDARD 8.2 (Technology Education) All students will develop an understanding of the nature and impact of technology, engineering, technological design, and the designed world as they relate to the individual, society, and the environment.

**A. Nature and Impact of Technology**

**B. Design Process and Impact Assessment**

**C. Systems in the Designed World**

## CUMULATIVE PROGRESS INDICATORS:

### **Standard 5.1**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

#### **A. Habits of Mind**

1. When making decisions, evaluate conclusions, weigh evidence, and recognize that arguments may not have equal merit.
2. Assess the risks and benefits associated with alternative solutions.
3. Engage in collaboration, peer review, and accurate reporting of findings.
4. Explore cases that demonstrate the interdisciplinary nature of the scientific enterprise.

#### **B. Inquiry and Problem Solving**

1. Select and use appropriate instrumentation to design and conduct investigations.
2. Show that experimental results can lead to new questions and further investigations.

#### **C. Safety**

1. Understand, evaluate and practice safe procedures for conducting science investigations.

## CUMULATIVE PROGRESS INDICATORS:

### **Standard 5.2**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

#### **A. Cultural Contributions**

1. Recognize the role of the scientific community in responding to changing social and political conditions and how scientific and technological achievement effect historical events.

#### **B. Historical Perspectives**

1. Examine the lives and contributions of important scientists who effected major breakthroughs in our understanding of the natural and designed world.
2. Discuss significant technological achievements in which science has played an important part as well as technological advances that have contributed directly to the advancement of scientific knowledge.
3. Describe the historical origin of important scientific developments such as atomic theory, genetics, plate tectonics, etc., showing how scientific theories develop, are tested, and can be replaced or modified in light of new information and improved investigative techniques.

## CUMULATIVE PROGRESS INDICATORS:

### **Standard 5.3**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

#### **A. Numerical Operations**

1. Reinforce indicators from previous grade level.

#### **B. Geometry and Measurement**

1. When performing mathematical operations with measured quantities, express answers to reflect the degree of precision and accuracy of the input data.

#### **C. Patterns and Algebra**

1. Apply mathematical models that describe physical phenomena to predict real world events.

#### **D. Data Analysis and Probability**

1. Construct and interpret graphs of data to represent inverse and non-linear relationships, and statistical distributions.

## CUMULATIVE PROGRESS INDICATORS:

### **Standard 5.4**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

#### **A. Science and Technology**

1. Know that scientific inquiry is driven by the desire to understand the natural world and seeks to answer questions that may or may not directly influence humans, while technology is driven by the need to meet human needs and solve human problems.

#### **B. Nature of Technology**

1. Assess the impacts of introducing a new technology in terms of alternative solutions, costs, tradeoffs, risks, benefits and environmental impact.

#### **C. Technological Design**

1. Plan, develop, and implement a proposal to solve an authentic, technological problem.

## CUMULATIVE PROGRESS INDICATORS:

### Standard 5.7

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

#### A. Motion and Forces

1. Apply the mathematical relationship between the mass of an object, the net force exerted on it, and the resulting acceleration.
2. Explain that whenever one object exerts a force on another, an equal and opposite force is exerted on the first object.
3. Recognize gravity as a universal force of attraction between masses and that the force is proportional to the masses and inversely proportional to the square of the distance between them.
4. Recognize that electrically charged bodies can attract or repel each other with a force that depends upon the size and nature of the charges and the distance between them and know that electric forces play an important role in explaining the structure and properties of matter.
5. Know that there are strong forces that hold the nucleus of an atom together and that significant amounts of energy can be released in nuclear reactions (fission, fusion, and nuclear decay) when these binding forces are disrupted.
6. Explain how electromagnetic, gravitational, and nuclear forces can be used to produce energy by causing chemical, physical, or nuclear changes and relate the amount of energy produced to the nature and relative strength of the force.
7. Demonstrate that moving electric charges can produce magnetic forces and moving magnets can produce electric forces
8. Recognize that magnetic and electrical forces are different aspects of a single electromagnetic force.

#### B. Energy Transformations

1. Explain how the various forms of energy (heat, electricity, sound, light) move through materials and identify the factors that affect that movement.
2. Explain that while energy can be transformed from one form to another, the total energy of a closed system is constant.
3. Recognize that whenever mechanical energy is transformed, some heat is dissipated and is therefore unavailable for use.
4. Explain the nature of electromagnetic radiation and compare the components of the electromagnetic spectrum from radio waves to gamma rays.

## CUMULATIVE PROGRESS INDICATORS:

### Standard 5.8

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

#### A. Earth's Properties and Materials

1. Explain the interrelationship of the geosphere, hydrosphere, and the atmosphere.

#### B. Atmosphere and Water

1. Describe how weather (in the short term) and climate (in the long term) involve the transfer of energy in and out of the atmosphere.

#### C. Processes that Shape the Earth

1. Use the theory of plate tectonics to explain the relationship among earthquakes, volcanoes, mid-ocean ridges, and deep-sea trenches.
2. Know that Earth is a system in which chemical elements exist in fixed amounts and move through the solid Earth, oceans, atmosphere, and living things as part of geochemical cycles.
3. Recognize that the evolution of life on Earth has changed the composition of Earth's atmosphere through time.

## **D. How We Study the Earth**

1. Analyze the evidence produced by a variety of techniques that is used to understand changes in the Earth that have occurred over time.
  - topography
  - fossils
  - rock stratification
  - ice cores
  - radiometric data

## **Cumulative Progress Indicators: Standard 5.9**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

### **A. Earth, Moon, Sun System**

Reinforce indicators from previous grade level.

### **B. Solar System**

1. Explain that our solar system coalesced from a nebular cloud of gas and dust left from exploding stars.

### **C. Stars**

1. Describe the physical characteristics, stages of development, and the apparent motions of stars.

### **D. Galaxies and Universe**

1. Describe data gathering and observation technologies and explain how they are used to explore the solar system and beyond.
2. Cite evidence to describe the scientific theory of the origin of the universe and the current explanations of its evolution.

## **Cumulative Progress Indicators: Standard 5.10**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

### **A. Natural Systems and Interactions**

1. Distinguish naturally occurring process from those believed to have been modified by human interaction or activity.
  - ♣ climate change
  - ♣ ozone production
  - ♣ erosion and deposition
  - ♣ threatened and endangered species

### **B. Human Interactions and Impact**

1. Assess the impact of human activities on the cycling of matter and the flow of energy through ecosystems.
2. Use scientific, economic, and other data to assess environmental risks and benefits associated with societal activity.

## **Cumulative Progress Indicators:**

### **Standard 8.1**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

#### **A. Basic Computer Skills and Tools**

1. Create a multi-page document with citations using word processing software in conjunction with other tools that demonstrates the ability to format, edit, and print.
2. Create documents including a resume and a business letter using professional format.
3. Construct a spreadsheet, enter data, use mathematical or logical functions to manipulate and process data, generate charts and graphs, and interpret the results.
4. Given a database, define fields, input data from multiple records, produce a report using sort and query, and interpret the data.
5. Produce a multimedia project using text, graphics, moving images, and sound.
6. Produce and edit page layouts in different formats using desktop publishing and graphics software.
7. Develop a document or file for inclusion into a website or web page.
8. Discuss and/or demonstrate the capability of emerging technologies and software in the creation of documents or files.
9. Merge information from one document to another.

#### **B. Application of Productivity Tools**

##### **Social Aspects**

1. Describe the potential and implications of contemporary and emerging computer applications for personal, social, lifelong learning, and workplace needs.
2. Exhibit legal and ethical behaviors when using information and technology, and discuss consequences of misuse.
3. Make informed choices among technology systems, resources, and services in a variety of contexts.
4. Use appropriate language when communicating with diverse audiences using computer and information literacy.

##### **Information Access and Research**

5. Select and use specialized databases for advanced research to solve real world problems.
6. Identify new technologies and other organizational tools to use in personal, home, and/or work environments for information retrieval, entry, and presentation.
7. Evaluate information sources for accuracy, relevance, and appropriateness.
8. Compose, send, and organize e-mail messages with and without attachments.

##### **Problem Solving and Decision Making**

9. Create and manipulate information, independently and/or collaboratively, to solve problems and design and develop products.
10. Identify, diagnose, and suggest solutions for non-functioning technology systems.
11. Identify a problem in a content area and formulate a strategy to solve the problem using brainstorming, flowcharting, and appropriate resources.
12. Integrate new information into an existing knowledge base and communicate the results in a project or presentation.

## **Cumulative Progress Indicators:**

## **Standard 8.2**

Building upon knowledge and skills gained in preceding grades, by the end of **Grade 12**, students will:

### **A. Nature and Impact of Technology**

1. Use appropriate data to discuss the full costs, benefits and trade-offs, and risks related to the use of technologies.
2. Explain how technological development is affected by competition through a variety of management activities associated with planning, organizing, and controlling the enterprise.
3. Provide various examples of how technological developments have shaped human history.

### **B. Design Process and Impact Assessment**

1. Analyze a given technological product, system, or environment to understand how the engineering design process and design specification limitations influenced the final solution.
2. Evaluate the function, value, and appearance of technological products, systems, and environments from the perspective of the user and the producer.
3. Develop methods for creating possible solutions, modeling and testing solutions, and modifying proposed design in the solution of a technological problem using hands-on activities.
4. Use a computer assisted design (CAD) system in the development of an appropriate design solution.
5. Diagnose a malfunctioning product and system using appropriate critical thinking methods.
6. Create a technological product, system, or environment using given design specifications and constraints by applying design and engineering principles.

### **C. Systems in the Designed World**

1. Explain the life cycle of a product from initial design to reuse, recycling, remanufacture, or final disposal, and its relationship to people, society, and the environment, including conservation and sustainability principles.
2. Analyze the factors that influence design of products, systems, and environments.
3. Compare and contrast the effectiveness of various products, systems, and environments associated with technological activities in energy, transportation, manufacturing, and information and communication.

## **SUGGESTED ACTIVITIES THAT ADDRESS THESE STANDARDS MAY INCLUDE BUT ARE NOT LIMITED TO:**

### **STANDARD 5.1**

- A.**
- 1.) Done throughout the year when doing labs/activities that are listed under standards 5.6, 5.7, 5.8, 5.9 and 5.10.
  - 2.)
    - Done throughout the year when doing labs/activities that are listed under standards 5.6, 5.7, 5.8, 5.9 and 5.10.
    - Students to read an article entitled “Engineering the Climate” and debate whether we should try to “fix” the damage that we have done to our atmosphere. Students write a position paper stating whether they agree or disagree with these possible solutions to the problem of global warming.
  - 3.) Done throughout the year when doing labs/activities that are listed under standards 5.6, 5.7, 5.8, 5.9 and 5.10.
  - 4.)
    - Students to study waves and wave motion and understand how the study of earthquake waves has allowed scientists to determine the composition of the earth’s interior.
    - Students to understand how sonar works and how the use of this technology by the U.S. Navy allowed scientists to determine that the seafloor moves giving Alfred Wegner the mechanism he needed to prove his Theory of Plate Tectonics.
- B.**
- 1.) Done throughout the year when doing the activities listed below and when doing labs/activities that are listed under standards 5.6, 5.7, 5.8, 5.9 and 5.10.
    - Determine the speed of a rubber band car that the students will design and build.
    - Determine how the slope of a ramp affects the speed of a car.
    - Determine what variable affects the speed of a pendulum.
  - 2.) Done throughout the year when doing labs/activities that are listed under standards 5.6, 5.7, 5.8, 5.9 and 5.10.
- C.**
- 1.) Done throughout the year when doing labs/activities that are listed under standards 5.6, 5.7, 5.8, 5.9 and 5.10.

### **STANDARD 5.2**

- A.**
- 1.)
    - Discuss how the use of submarines during World War II required the United States to map the seafloor using sound waves (sonar) and how this technology allowed the mechanism for the movement of the earth’s plates to be discovered.
    - Discuss the industrial revolution and how this change in the world’s economy led to our current crisis of global warming.
    - Discuss new technology that led to the change in planetary status of Pluto.
      1. Students to view pictures of the universe that were taken by the Hubble telescope.
- B.**
- 1.) Students to study the work of Sir Isaac Newton, Alfred Wegner, Edmund Halley and John Symmes (The Hollow Earth Theory).
  - 2.) Students to discuss technology available that helped us determine the earth’s interior (earthquake waves), seafloor spreading (sonar) and Pluto’s new status as a dwarf planet (Hubble telescope).
  - 3.) The Theory of Plate Tectonics will be discussed in great detail. (See 5.8.C.1)

### STANDARD 5.3

- A.** 1.) - Students to solve for the following: speed, velocity, momentum, acceleration and force.
- Students to determine averages when required throughout the year.
  - Students to determine the amount of mass held per gram of wood to determine the winning bridge during our bridge building unit.
  - Students to determine the distance the planet that they research is from Earth and how long it will take to get to their planet traveling at the speed of light.
  - Students to use dimensional analysis to convert quantities within the metric system and from the American system to the metric system and vice versa.
- B.** 1.) - See activities Standard 5.3.A.1. Students will reflect all of their answers to reflect the degree of precision and accuracy of the input data.
- C.** 1.) - Students to confirm the acceleration of gravity of a bowling ball and a tennis ball dropped from the top of the bleachers by using the equation  $a = 2d/t^2$ .
- D.** 1.) - Students will construct graphs throughout the year to represent experimental data.
- Students to construct graphs that represent positive acceleration, negative acceleration and zero acceleration.
  - Students will construct and interpret graphs that represent worldwide earthquake activity.
  - Students will read seismographs and interpret time vs. distance graphs to determine an earthquake's epicenter. Students will read a Richter Nomogram to determine the magnitude of an earthquake.

### STANDARD 5.4

- A.** 1.) The relationship between science and technology is discussed throughout the year.
- B.** 1.) The risks and benefits of engineering the climate to avert global warming are discussed. Students write an opinion paper regarding the proposed solutions.
- C.** 1.) - Students to design and build a bridge. Students to test their bridges and use mathematics to determine which bridge was able to withstand the most force.
- Additional problem solving done throughout the year.

### STANDARD 5.7

- A.** 1.) Students to solve problems regarding Newton's second law.
- 2.) - Students to understand how Newton's third law affects an object's motion through discussion and demonstration.
- 3.) - Through discussion students to recognize that gravity is a force that is exerted by all objects and that it is proportional to the masses of the objects and inversely proportional to the distance.
1. Discuss gravity and its importance to the solar system. Discuss the outer planets and gravity's role in the formation of their rings and attracting their moons

- 4.) Covered in Matter & Energy.
- 5.) Covered in Matter & Energy.
- 6.) Covered in Matter & Energy.
- 7.) Covered in Matter & Energy.
- 8.) Covered in Matter & Energy.
- B.**
  - 1.) Covered in Matter & Energy.
  - 2.) Covered in Matter & Energy.
  - 3.) Covered in Matter & Energy.
  - 4.) Covered in Matter & Energy.

**STANDARD 5.8**

- A.**
  - 1.) The geosphere, hydrosphere and atmosphere are studied individually in great detail along with how a change in one affects the others. Activities listed below and under 5.8.B.1 and 5.8.C.1 are done to reinforce information presented.
    - Students watch movie, “Journey to the Center of the Earth”, and write an essay comparing and contrasting how Jules Verne’s version of the earth’s interior differs from our current thinking.
    - Discuss the “Hollow Earth” theory and how technology, which allows us to study the behavior of earthquake waves, has allowed scientists to determine the earth’s interior.
    - Students to look at pieces of cut fruit and determine which fruit looks most like the earth’s interior and which one is least like the earth’s interior.
- B.**
  - 1.)
    - Students to be able to label/diagram the steps of the water cycle and carbon cycle.
      - 1. Students to understand how the sun’s energy powers both cycles.
      - 2. Students will go “cloud watching” and be able to identify the different types of clouds and what type of weather they represent.
      - 3. Understand how tropical weather conditions over the Atlantic Ocean cause the formation of hurricanes that affect the south eastern coast of the United States.
      - 4. Students to determine how man is affecting the water and carbon cycles.
    - Looking at diagrams, differentiate between warm, cold and stationary fronts and determine the type of weather they cause.
    - Students to differentiate between the different layers of the atmosphere and understand the importance of the ozone layer to life on earth.
    - Students to prepare an educational pamphlet or power point on how man is changing the greenhouse effect which is leading to global warming/climate change.
    - Students to write an opinion paper weighing the merits of climate engineering.
      - 1. As a class we will read the article, “Engineering the Climate” which will allow them understand how a volcanic eruption can affect the earth’s temperature and atmosphere.
      - 2. Students to discuss/debate the pros and cons of schemes that are being proposed.
- C.**
  - 1.)
    - Students to watch the movie, “The Deep” which will allow them to observe mid-ocean ridges and deep-sea trenches

- Students to plot selected earthquakes on a map according to the longitude and latitude which will allow students to observe that most earthquakes occur at plate boundaries.
    1. Students to graph earthquake data and answer related questions.
  - Students to find the epicenter and magnitude of an earthquake using on-line data (geology labs on-line).
  - Students to model reverse, normal and strike-slip faults allowing them to see how each type of fault can change the landscape of the earth.
    1. The forces of compression and tension will be observed.
  - Students to research a volcano and determine its type, location, landform developed, type of plate boundary on which it is located, etc.
    1. Students to present research in a power point or on a poster board and present their research to the class.
  - Students to draw the different types of plate boundaries color coding the different crusts involved.
    1. Students to draw in the landform that develops along with deep sea trenches.
    2. Students to determine what type of disturbances occur at the different boundaries.
  - Students to look at a map of the world and determine the type of plate boundary is represented using a key. They will also determine the type of crusts involved and the type of landform that will develop at that location.
- 2.) - Students to be able to label/diagram the steps of the water cycle and carbon cycle.
1. Students to understand how the sun's energy powers both cycles.
- 3.) - Students to understand the role of photosynthetic bacteria in changing the earth's atmosphere into an oxidizing atmosphere approximately 2.7 billion years ago.
- D.**
- 1.) - Students to read topographic maps and answer related questions.
    1. Students to build a topographic model of an island and answer related questions.
  - Students to look at examples of metamorphic, sedimentary and igneous rocks.
    1. Students to determine the conditions that were present to form certain igneous rocks presented.

### **STANDARD 5.9**

- A.**
- 1.) - Students to observe pictures of the different planets in our solar system and be able to differentiate between them.
  - Students to research a planet and make an advertisement to entice people to travel to their planet.
  - Students to debate Pluto's new status as a dwarf planet.
    1. Students to write an opinion paper on whether they agree with the decision of the IAU.
- B.**
- 1.) - Students to observe nebular clouds using photos taken by the Hubble Telescope and understand their role in the formation of our solar system.
- C.**
- 1.) - Students to differentiate between the different layers that make up a star.
  - Students to differentiate between a red giant and white dwarf and understand their formation during the stages of a star's death.
- D.**
- 1.) - Students to observe pictures of space from the Hubble Telescope.
  - Discuss the use of spectrometry in determining the layers of the sun.
  - 2.) - Students to understand the big bang theory and the evidence that supports it

1. Discussion of multiple universes and parallel universes.

### **STANDARD 5.10**

- A.**    **1.)**    - Students to prepare an educational pamphlet or power point on how man is changing the greenhouse effect which is leading to global warming/climate change.
- Discussion of the use of CFCs and the destruction of the ozone layer.
    1. Students to observe seasonal changes in the ozone layer over Antarctica (<http://it.geocities.com/allfonsit/ozlain.html>).
- B.**    **1.)**    - Discuss the impact of human activities on the water and carbon cycles.
  1. Nitrogen lab
- 2.)**    - Students to prepare an educational pamphlet or power point on how man is changing the greenhouse effect which is leading to global warming/climate change.
- Students to write an opinion paper weighing the merits of climate engineering.
    1. As a class we will read the article, "Engineering the Climate" which will allow them understand how a volcanic eruption can affect the earth's temperature and atmosphere.
    2. Students to discuss the pros and cons of additional schemes that are being proposed.

### **STANDARD 8.1**

- Students will use the internet to do research throughout the year. Word documents, pamphlets and/or power points will be produced by the students. Topics to be researched may include volcanoes, greenhouse effect, global warming and the planets.
- Students will be exposed to online databases, such as, [usgs.gov](http://usgs.gov) and Google Earth when studying earthquakes and volcanoes.

### **STANDARD 8.2**

- Students to design and build a bridge. After testing their bridges, students will analyze the data collected and the different bridge designs to determine why their bridge and the winning bridge performed as well or as poorly as it did.
  - Students to use the website [www.pbs.org/wgbh/buildingbig/bridge/index.html](http://www.pbs.org/wgbh/buildingbig/bridge/index.html) to enable them to understand the different types of bridges and the pros and cons of their designs.
    - . The website also allows students to observe the different types of environmental forces that an engineer must consider when designing and building a bridge.
  - Teacher to present a power point on bridge designs and demonstrate how different environmental forces can cause a bridge to "fail".
  - Students to read about the Akashi Kaikyo Bridge and the design challenge that it presented to its engineers and the solutions that they came up with to enable them to build the bridge.

## **INSTRUCTIONAL STRATEGIES:**

**(Included in the presentation of each unit will be lecture/discussion and guided practice, independent practice, video presentations, cooperative learning activities and differentiated instruction)**

### **STANDARD 5.1**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year to help students develop problem-solving, decision-making and inquiry skills. These strategies include: lecture/discussion, power point presentation regarding the scientific method, guided practice, independent practice and cooperative learning activities and laboratory experiences.

### **STANDARD 5.2**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year to help students develop an understanding of the various contributions of different cultures and the relationship between science and technology. These strategies include: lecture/discussion, video presentations, power point presentations and cooperative learning.

### **STANDARD 5.3**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year to integrate mathematics as a tool for problem-solving in science. These strategies include: lecture/discussion, guided practice, independent practice, cooperative learning activities, laboratory experiences and differentiated instruction.

### **STANDARD 5.4**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year to enable students to understand the interrelationship between science and technology. These strategies include: lecture/discussion, student research and cooperative learning.

### **STANDARD 5.7**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year which will allow students to gain an understanding of natural laws as they apply to motion and forces. These strategies include: lecture/discussion, cooperative learning activities, laboratory experiences, teacher demonstrations, guided and independent practice, and a power point presentation on the solar system.

### **STANDARD 5.8**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year which will allow students to gain an understanding of the structure, dynamics and geophysical systems of the earth. These strategies include: lecture/discussion, cooperative learning activities, teacher demonstrations, presentation of real-time data, individual student research, student made presentations, video presentations and guided and independent practice.

Power point presentations will be presented to the class on the following topics:

- Earth's interior
- Plate tectonics
- Earthquakes
- Volcanoes
- The atmosphere
- Weather

### **STANDARD 5.9**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year which will allow students to gain an understanding of the origin, evolution and structure of the universe. These strategies include: lecture/discussion, presentation of planetary data, cooperative learning activities, independent and guided practice, student presentations and debate.

Power point presentations will be presented to the class on the following topics:

- The planets
- The sun
- The moon
- The universe

### **STANDARD 5.10**

#### **Teacher will:**

A variety of instructional strategies will be used throughout the year which will allow students to gain an understanding of how the environment is a system of independent components affected by human activity and natural phenomena. These strategies include: lecture/discussion, cooperative learning activities, independent and guided practice, student research and student-made presentations (power point or pamphlet) and debate.

### **STANDARD 8.1**

#### **Teacher will:**

Technology will be infused into the curriculum throughout the year using the following techniques:

- Present several lessons using power point.
- Use "Google-Earth" during some lesson presentations.
- Present recent earthquake data using the USGS website.
- Require students to use the internet to research topics and generate power point presentations.

### **STANDARD 8.2**

#### **Teacher will:**

Technology will be infused into the curriculum throughout the year. The following are examples of use of technology in the classroom:

- Students to design and build a bridge. After testing their bridges, students will analyze the data collected and the different bridge designs to determine why their bridges performed as well or as poorly as they did.
- Students to use the website [www.pbs.org/wgbh/buildingbig/bridge/index.html](http://www.pbs.org/wgbh/buildingbig/bridge/index.html) to enable them to understand the different types of bridges and the pros and cons of their designs.
  - . The website also allows students to observe the different types of environmental forces that an engineer must consider when designing and building a bridge.
- Present a power point presentation on bridge designs and demonstrate how different environmental forces can cause a bridge to "fail".
- Students to watch a video of the Tacoma Narrows Bridge failing.
- Students to read about the Akashi Kaikyo Bridge and the design challenge that it presented to its engineers and the solutions that they came up with to enable them to build the bridge.

## **EVALUATION/ASSESSMENT OF STUDENTS:**

Homework Category: 40%

Labs/projects Category 30%

Test Category 30%

## **EVALUATION/ASSESSMENT OF CURRICULUM:**

This course of study will be evaluated/assessed by instructional staff during the first year of implementation for the purpose of necessary revision at the end of the first year. In addition, this course of study will be reviewed according to the Five-Year Curriculum Review schedule.

## **RESOURCES/BIBLIOGRAPHY:**

<http://education.state.nj.us/cccs/>

Holt Science Spectrum, Textbook, Holt/Rinehart/Winston - 2001

Teacher resources and knowledge