

### **Spectrum Program Two-Week Session**

**Course Title:** Forces In Our World: Environmental Physics

#### **Course Description**

Earth is an awesome place—plates shift, volcanoes erupt, and weather patterns change. To survive in our environment it is necessary to understand the basic principles that regulate it. The study of environmental physics provides insight into our world. Through readings, experiments and discussions, students investigate how energy and force affect processes from plate tectonics to heating and cooling a home, learn what  $E=mc^2$  really means, and discover why heat transport is relevant to their lives. Students gain an understanding of the physical concepts that govern the world as well as an awareness of technologies humans are developing to harness and manage the Earth's powerful forces.

The course will be based on major Earth phenomena and major occurrences in weather and natural formations. We will conduct research and become fluent in nature's forces along with current technology to investigate these forces.

#### **Essential Questions**

- What major occurrences shape the landscape of Earth?
- What factors cause major weather events?
- How can we use technology to help understand the forces on Earth?

#### **Outcomes**

- Upon successful completion of this course, students will:
- Know (major natural occurrences in our world both past and present along with physical principles that affect their daily lives.)
- Understand (the technology used by scientists to obtain data and gain an understanding of our world.)
- Apply (a working knowledge of Earth's weather phenomena using terminology from Physics and Chemistry. The student will be required to research and coalesce information from a variety of sources and explain ideas to other students in the class.)
- Analyze, synthesize, or create (students will be able to effectively research scientific journals and texts. Students will understand what is required for a meaningful presentation of ideas and the pros and cons of working in groups to produce ideas.)

#### **Instructional Strategies**

This class will center on PBL (Problem Based Learning). During the course various groups will be charged with researching a variety of topics involving major environmental events. With help from daily classroom instruction and research brainstorming sessions we will develop lists of topics we must cover to fully understand the major problem goals. Groups will work together to gain expertise in these fields and will be required to develop methods to inform the other classmates along with myself.

#### **Resources and Materials**

- a. **Books:** To be found through in-class research
- b. **Web sites:** To be found through in-class research
- c. **Other Media:** Informational Packets will be handed out throughout the course
- d. **Materials:** Calculator, Binder (with tab indexes), notebook, pens, pencils

### Student Assessment

**a. Pre-Assessment:**

A test assessment will be given based on the topics we plan to cover. These topics include physics principles and recent weather events.

**b. Documentation of Learning:**

During the two weeks groups of students will be required to present information to the class. These presentations will be assessed and contribute towards the final presentation. Quizzes will be given several times throughout the class to monitor presented material. As a final project, each group will be responsible for analyzing and describing a specific weather event using the concepts uncovered throughout the class.

**c. Post-Assessment:** Assessment will be given based on acquired knowledge from presentations given by all research groups. A post assessment will be in the form a test in addition to a formal group presentation concerning the material.

### Schedule

Dates	Topic(s)	In-class Activities	Graded Assignments and/or Assessment
1 (7/18/11)	Introductions Current Events Basic Physics Principles Force/Pressure (Air-Water) Research Groups	Pre-Test  Lab #1 Topic Brainstorming	Lab Results/Conclusions
2	Major Environmental Events/Physics Topics Know/Need To Know	Tiered Assignments Problem-Solving Group Research	Research Notebook Group Info Sessions
3	Rotational Inertia and Momentum	Peer Teaching Flexible Grouping	Worksheets/Quiz #1
4	Field Trip to MSI to explore "Science Storms" and "Tornado Alley"	Group Research Tiered Assignments	Field Trip to MSI
5	Small Presentations on Museum Experience/Learning Physics Topics (Force/Pressure, Tension- Compression)	Lab #2 Flexible Grouping Group presentations	
6	Topics Review Know/Need to Know Energy, Vibrations, Light, Sound	Lab #3 Flexible Grouping	Quiz #2 Research
7	Electrostatics, Lightning, Density, Fluid Flow	Lab #4 Flexible Grouping	Research Notebook
8	Presentation Strategy Student Research and Development	Tiered Assignments	Quiz #3

Dates	Topic(s)	In-class Activities	Graded Assignments and/or Assessment
9	Finalize Presentations	Peer Teaching	
10	Final Presentations/Post Assessment		

**CTD Statement on Third-Party Web Sites**

Instructors are required to thoroughly review any third-party web sites they intend to use in their courses for inappropriate content. However, because web content continuously changes, CTD disclaims any responsibility for any of the content contained on third-party web sites used in course materials. If you become aware of anything that may be inappropriate, please notify CTD staff immediately.

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