

# Natural Disasters

Science Elective

Grades 6-8

Elective Overview

Department of Equity, Curriculum and

Revised: July 2019

Instruction Approved by the Montclair Board of Education: August 2019



## Montclair Public School Elective Overview

### Instructional Plan

**Course: Natural Disasters**

**Marking Period or Trimester: Semester**

**Pacing: 20 Weeks**

### Next Generation Science Standards

#### Earth's Place in the Universe

MS-ESS1-4 Construct a scientific explanation based on evidence from rock strata for how the geologic time scale is used to organize Earth's 4.6-billion-year-old history.

#### Earth's Systems

MS-ESS2-2 Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.

MS-ESS2-3 Analyze and interpret data on the distribution of fossils and rocks, continental shapes, and seafloor structures to provide evidence of the past plate motions.

MS-ESS2-5 Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.

#### Earth and Human Activity

MS-ESS3-2 Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

MS-ESS3-3 Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.\*

MS-ESS3-5 Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

#### Engineering Design

MS-ETS1-1 Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2 Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

### Framing the Learning

| <b>Timeframe</b> | <b>Big Ideas</b>                      | <b>Essential Questions</b>  | <b>Enduring Understandings</b>  |
|------------------|---------------------------------------|---|---|
| <b>1 Week</b>    | <b>Natural vs. Man-Made Disasters</b> | <ul style="list-style-type: none"> <li>• What are examples of natural disasters and how have these events shaped the surface of our planet?</li> <li>• How can a disaster be considered “man-made”?</li> </ul>  | <ul style="list-style-type: none"> <li>• Natural disasters are caused by natural processes, but some of these processes are able to be affected by human activity.</li> </ul>   |
| <b>4 Weeks</b>   | <b>Earthquakes</b>                    | <ul style="list-style-type: none"> <li>• Why are there earthquakes?</li> <li>• How do we know where they are likely to occur?</li> <li>• How are earthquakes related to the theory of plate tectonics?</li> <li>• What are faults?</li> <li>• How is the strength of an earthquake measured?</li> <li>• What is the correct way to react to an oncoming earthquake?</li> </ul>                  | <ul style="list-style-type: none"> <li>• The theory of plate tectonics explains various changes that occurred on Earth’s surface</li> <li>• Specific landforms are created by plate movement, and can be found at plate boundaries.</li> <li>• Topographical maps can be used to see how plate movement has shaped the Earth’s surface.</li> <li>• Seismic waves travel through Earth and are used to measure the strength of an earthquake, and locate the epicenter.</li> </ul> |
| <b>4 Weeks</b>   | <b>Volcanoes</b>                      | <ul style="list-style-type: none"> <li>• How can a volcano form?</li> <li>• What are the parts of a volcano?</li> <li>• Are there different types of lava?</li> <li>• Can an eruption be predicted? How long ahead of time?</li> <li>• How does a map of the ‘Ring of Fire’ relate to the locations of volcanoes?</li> <li>• Are the locations of earthquakes and volcanoes related?</li> </ul> | <ul style="list-style-type: none"> <li>• Volcanoes are formed at plate boundaries and hot spots.</li> <li>• Locate on a map the recent volcanoes and earthquakes.</li> <li>• Volcanoes differ in shape, lava type, and ability to erupt.</li> <li>• The Ring of Fire shows a pattern of volcanoes that occur on specific continents, and plate boundaries.</li> </ul>   |
| <b>2 Weeks</b>   | <b>Tsunami</b>                        | <ul style="list-style-type: none"> <li>• What is a tsunami?</li> <li>• How did the Boxing Day disaster in the Indian Ocean change how countries are warned of approaching tsunamis?</li> </ul>  | <ul style="list-style-type: none"> <li>• Tsunamis can be caused by seismic activity on the ocean floor.</li> <li>• Tsunamis can be caused by human activity.</li> </ul>   |
| <b>4 Weeks</b>   | <b>Hurricanes</b>                     | <ul style="list-style-type: none"> <li>• How and where do hurricanes form?</li> <li>• How and why are these storms named?</li> <li>• How is the strength of a hurricane measured?</li> <li>• Do hurricanes have predictable paths?</li> <li>• What types of damage are caused by hurricanes?</li> </ul>   | <ul style="list-style-type: none"> <li>• Hurricanes form during specific conditions, and move based on low and high-pressure systems.</li> <li>• Hurricanes are able to be predicted and preparation is possible for an approaching hurricane.</li> <li>• Hurricanes can cause extensive damage to areas prone to these storms.</li> <li>• Hurricanes are directly affected by warming ocean temperatures.</li> </ul>   |
| <b>3 Weeks</b>   | <b>Climate Change</b>                 | <ul style="list-style-type: none"> <li>• Identify patterns that occur through the climate record of our planet?</li> </ul>  | <ul style="list-style-type: none"> <li>• Ice ages are prominent examples of the effects of climate change.</li> </ul>   |

|                |                 |  |   |
|----------------|-----------------|--|---|
|                |                 | <ul style="list-style-type: none"> <li>• How has human activity affected the amount of carbon dioxide in the atmosphere?</li> <li>• Identify adaptations that will be needed if the global temperatures rise to their predicted levels by 2050.</li> </ul> | <ul style="list-style-type: none"> <li>• Climate change is any significant long-term change in the expected climate patterns of the whole Earth over a significant period of time.</li> <li>• Climate change is about abnormal variations to the climate, and the effects of these variations.</li> </ul> |
| <b>2 Weeks</b> | <b>Survival</b> | <ul style="list-style-type: none"> <li>• How long can a person go without food or water?</li> <li>• How does the survival strategy change between different climate zones?</li> </ul>  | <ul style="list-style-type: none"> <li>• Oxygen and water are the most essential human needs.</li> <li>• The human body can survive a long period of time without food.</li> </ul>  |

### Evidence of Learning

Throughout the course of the semester, students will complete activities and projects that demonstrate their knowledge on how to collect data on types of natural disasters and analyze the data to enhance the response to these disasters.

Topographic Salt Dough Map  
 Levee Blueprint  
 Building Models  
 Lab Worksheets  
 Student Presentations  
 Observations of Student Behavior

### Activities

Students will engage in various hands-on activities that revolve around the occurrence of natural disasters, and how damage from these events can be minimized through engineering achievements. These activities are a mix of labs and projects, engineering and designing different models, and case studies.

**Historical Disasters:** Students investigate historical disasters that were classified as ‘natural’ and ‘man-made’.

**Plate Tectonics:** The theory is investigated, and students use maps to provide evidence to support plate tectonics.

**Lego Towers:** Students design a tower that has curbside appeal, but can also withstand strong earthquakes.

**Bridge Engineering:** Students design a bridge that can be used in an area that is prone to earthquakes.

**Salt Dough Continents:** Student use salt dough to create a topographic map of a region that is located in the “Ring of Fire”.

**Types of Lava:** Students develop different types of lava, and compare each type through demonstrations.

**Boxing Day Disaster:** Students research the Boxing Day disaster, and identify the changes that were made to how countries are alerted of approaching tsunami waves.

**House Boat:** Students design a house that is able to float on water.

**Track a Hurricane:** Student map the path of a hurricane and analyze how the storm strengthened and weakened during its path.

**Katrina Investigation:** Students investigate Hurricane Katrina and identify the mistakes that were made in the response to the disaster.

**Levee Building:** Students construct a levee system for a town using a stream table.

**Evidence Poster:** Students create a poster that conveys the effect that climate change is having on our planet.

**Survival Scenarios:** Students complete several survival scenarios that take place in different climate zones on the planet.

**Engineering for Survival:** Students design a device that will help them adapt to the effects of climate change that can possibly be felt in 2050.

## DIFFERENTIATION

| Special Education  | ELL   | Intervention  | Acceleration   |
|--|---|---|--|
| <ul style="list-style-type: none"> <li>● Modify and accommodate as listed in student’s IEP or 504 plan</li> <li>● Prioritize instruction</li> <li>● Utilize wait-time</li> <li>● Ensure directions are clear and concise</li> <li>● Utilize probing and clarifying questions</li> <li>● Support instruction with scaffolding</li> <li>● Model (provide step by step instructions) use of learning strategies</li> <li>● Provide extended time for practice and review of learning strategies</li> <li>● Identify, categorize, and teach words critical to understanding instructional texts</li> <li>● Utilize multiple approaches to monitor student understanding</li> <li>● Create rubrics to develop assessments</li> <li>● Vary assessments</li> <li>● Assign peer assisted reading and tutoring</li> <li>● Provide individual help to all students</li> <li>● Create opportunities for/Monitor peer collaboration</li> <li>● Monitor student progress frequently</li> <li>● Utilize flexible/cooperative grouping based on instructional goals</li> <li>● Prioritize and chunk lengthy assignments</li> <li>● Utilize assistive technology, when appropriate</li> <li>● Provide ongoing, effective, specific feedback</li> <li>● Model/Utilize graphic organizers</li> <li>● Provide leveled reading materials</li> <li>● Utilize visual aids and props (flashcards, pictures, symbols) when possible</li> <li>● Utilize a multi-sensory approach to new topics</li> </ul> | <ul style="list-style-type: none"> <li>● Get to know student</li> <li>● Set high expectations</li> <li>● Learn/Utilize/Display some words in student’s heritage language</li> <li>● Allow electronic translator</li> <li>● Reword, repeat, and clarify directions</li> <li>● Determine student knowledge and level of understanding</li> <li>● Research instruction that best matches student need</li> <li>● Utilize ongoing informal assessments</li> <li>● Refer to NJDOE Resources: <a href="https://www.state.nj.us/education/bilingual/resources/">https://www.state.nj.us/education/bilingual/resources/</a></li> <li>● NJDOE ELL Support Descriptions: <a href="https://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf">https://www.state.nj.us/education/modelcurriculum/ela/ELLSupport.pdf</a></li> </ul> <p><b>*Review Special Education list for additional recommendations.*</b></p> | <ul style="list-style-type: none"> <li>● Tiered Interventions following RtI framework</li> <li>● RtI Intervention Bank</li> <li>● Foundations Double-Dose (Tier II)</li> <li>● LLI (Tier III)</li> <li>● FFI Skill Report: DRA On-Line</li> <li>● enVision intervention supports NJDOE resources</li> </ul> | <ul style="list-style-type: none"> <li>● Process should be modified: higher order thinking skills, open-ended thinking, discovery</li> <li>● Utilize project-based learning for greater depth of knowledge</li> <li>● Utilize exploratory connections to higher grade concepts</li> <li>● Contents should be modified: abstraction, complexity, variety, organization</li> <li>● Products should be modified: real world problems, audiences, deadlines, evaluation, transformations</li> <li>● Learning environment should be modified: student-centered learning, independence, openness, complexity, groups varied</li> </ul> |

