Unit 8 - Plate Motion Engineering Internship

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **Full Year**
Status: **Published**

Unit Overview

In the Plate Motion Engineering Internship, students will consider the design problem of how to protect people from these natural hazards, using historical data about the frequency of different magnitudes of earthquakes along the plate boundaries in the Indian Ocean region. Specifically, students work as geohazards engineering interns to design a tsunami warning system. They will use a digital model to simulate placing earthquake, deep water, and shallow water sensors at various places in the Indian Ocean region in order to maximize the response time people receive to get to safety, minimize the number of false alarms so people don't become complacent and resources are not wasted from evacuating unnecessarily, and minimize the cost so local governments can afford to install the warning system and maintain it for many years to come.

Enduring Understandings

A tsunami wave can result in severe damage due to rapid flooding of land.
Tsunamis can be smaller and only affect nearby areas, or they can be large enough to travel across the ocean.
Most dangerous ocean-wide tsunamis occur from an earthquake of 8.0 magnitude or greater at a convergent plate boundary.

Essential Questions

What is a tsunami?
How does an earthquake occur?
What can prevent damage from a natural disaster?
How does a tsunami react different in water depth?

Learning Objectives

Demonstrate understanding of geography.
Explain what is a tsunami.
Explain what causes a tsunami.
Research, design, and create proposal to prevent natural disasters.
Be able to ask questions and develop models
Analyze and interpret data on earthquakes and tsunami waves.

Standards: Content

MS-ESS1-1	Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
MS-ESS1-2	Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system.
MS-ESS1-3	Analyze and interpret data to determine scale properties of objects in the solar system.
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-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.

Standards: Interdisciplinary

Assessment Evidence

Formative	Teacher observations, Class discussions, Lab Activities, Key concepts and vocabulary quizzes, Warm Ups, Open Ended Responses, Modeling, Simulations, Innovators Monthly Research
Summative	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. MS-ESS1-1., Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. MS-ESS1-2., Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. MS-ESS1-3., Analyze and interpret data to determine scale properties of objects in the solar system. 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. Other summative assessments will include but are not limited to: lesson activities, summative tests, lab skills, demonstrations, and vocabulary quizzes.
Alternative & Benchmark	Alternative - Read to the student and chart oral responses. Word banks, sentence frames, oral responses, graphic organizers, observations, portfolios of student work, orally administered assessments, and anecdotal notes. Benchmark – LinkIt Benchmark Assessment, Teacher Generated Assessments
Assessment Evidence Resource	

Instructional Resources

Smartboard, Computers, Websites and digital interactives/models, Multi-media presentations, Video Streaming, Amplify Digital Curriculum, Generation Genius, BrainPop, Mystery Science, Microsoft 365, Primary and Secondary Source Documents, Lab Materials as needed, Amplify Readings, Labs, Simulations

Instructional Resource List

Curricular Mandates

Below are the curricular requirements as defined in NJ Administrative Code and Statute

	Amistad		Diversity, Equity, and Inclusion
	Holocaust		LGBT and Disabilities (Grades 6-12)
	Climate Change		Asian American & Pacific Islander

Social Emotional Learning (SEL) Competencies

NJ Social and Emotional Learning Competencies & Sub-Competencies

	Self-Awareness		Relationship Skills
X	Responsible Decision-Making		Social Awareness

X	Self-Management		

21st Century Skills & Themes

	Global and Cultural Awareness		Technology Literacy		Planning and Budgeting
	Creativity and Innovation		Financial Institutions		Risk Management and Insurance
	Information and Media Literacy		Digital Citizenship		Economic and Government Influences
	Critical Thinking and Problem Solving		Credit Profile	X	Career Awareness and Planning
	Civic Financial Responsibility		Financial Psychology		