Unit 2: Meterology

Content Area: **Template**
Course(s):
Time Period:
Length:
Status: **Published**

Unit Summary

This unit explores the factors that drive weather patterns and influence global and regional climate systems. Students will examine the interactions between the atmosphere, the Sun's energy, and Earth's surface to understand how variations in energy flow affect weather and climate. They will analyze the structure and composition of the atmosphere, investigate the formation of different weather phenomena, and evaluate the evidence for climate change based on data and models. Emphasis will be placed on modeling atmospheric processes, interpreting meteorological data, and making predictions about future climate scenarios in alignment with NJSLS-S expectations.

Essential Questions

- How do scientists model and predict future climate trends?
- How do storm systems form?
- How do the layers of the atmosphere affect the Earth's surface?
- How does energy from the sun drive weather and climate systems on Earth?
- How does the flow of energy between Earth's systems influence atmospheric conditions?
- How is weather studied and analyzed?
- In what ways do human activities contribute to global climate change?
- What causes climate?
- What evidence do we have that Earth's climate is changing?

Objectives

- Analyze climate data to identify trends and make evidence-based predictions.
- Analyze how weather systems are measured, tracked, and predicted using modern technology.
- Explain the characteristics and formation of cold fronts and warm fronts.
- Identify greenhouses gases and how this could affect the climate of the Earth
- Identify how major storms affect an area and how they are formed
- Identify how solar energy is absorbed by the atmosphere
- Identify how weather systems are analyzed and measured
- Identify the origins and impacts of major storms such as hurricanes and tornadoes.
- Interpret meteorological data to draw conclusions about atmospheric conditions.
- Name the properties of cold fronts and properties of warm fronts.

- Name the properties of the four types of clouds and how clouds are formed
- Name the six layers of and determine the atmosphere how the temperature varies in each layer
- Use models to describe energy transfer in Earth's systems and its effect on climate.

Standards

SCI.HS-ESS2-4	Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
SCI.HS-ESS3-5	Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems.

State Mandated Topics Addressed in this Unit

This unit aligns with the following NJ Student Learning Standards for Science (NJSLS-S) and supports understanding of atmospheric science, climate systems, and data interpretation:

NJSLS-S Performance Expectations:

- **HS-ESS2-4**: Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.
- **HS-ESS2-5**: Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.
- **HS-ESS2-6**: Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.
- **HS-ESS3-5**: Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of climate change and its future impacts.

Integrated Mathematics Standards (NJSLS-M):

- **F-IF.B.6**: Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval.
- **S-ID.B.6**: Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

Science & Engineering Practices (SEPs):

- SEP 1: Asking Questions and Defining Problems
- SEP 2: Developing and Using Models
- SEP 3: Planning and Carrying Out Investigations
- SEP 4: Analyzing and Interpreting Data

- SEP 5: Using Mathematics and Computational Thinking
- SEP 6: Constructing Explanations and Designing Solutions
- SEP 7: Engaging in Argument from Evidence
- SEP 8: Obtaining, Evaluating, and Communicating Information

Crosscutting Concepts:

- Energy and Matter: Flows, Cycles, and Conservation
- Cause and Effect
- Stability and Change
- Systems and System Models

These standards support instructional objectives including:

- Understanding the structure and composition of the atmosphere
- Modeling weather phenomena and the transfer of energy in Earth's systems
- Interpreting meteorological and climate data
- Investigating the influence of solar radiation on weather patterns
- Evaluating scientific evidence of climate change
- Using data to model and predict future climate scenarios

Instructional Tasks/Activities

- Common assessment chapter test
- Common assessment quiz
- Constructed response
- Do nows and/or exit slips
- Exit Cards (answer to daily objective questions)
- Graphic organizers or models
- Homework
- Individual, small, and large group work

- Laboratory investigations within small groups
- Review Activity
- Section Review Questions
- Study Guide Packets
- Vocabulary flash cards or map (word, picture, sentence, example)

Assessment Procedure

- Flashcards and/or drill and practice
- Inquiry based activities with reflective discussion
- Laboratory groups
- Lecture with note taking or guided notes
- Online models and simulators
- Power point presentations
- Whole and small group discussions

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Copy/Paste Content Specific Link Here
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- Other- Specified in Lesson
- Quiziz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- Resource 1
- Resource 2
- Resource 3
- Resource 4
- Resource 5