TOWNGREEN2025
High School Climate Change Curriculum

Lesson 2
Climate Change

Unit Title: **Carbon Cycles through Ecosystems**	
Theme: **Ecosystems & Cycles**	Grade Level: **9-10**
# of sessions for the unit: **1-3 suggested 2-3 class period(s) (~45min)**	Session #1: **Abiotic factors that affect Climate**
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CC Climate Change Curriculum

Unit Description

Provided in a separate document. Please see High School Curricumum Overview.

Standard(s)

Based upon the 2016 MA Science & Technology/Engineering Curriculum Framework

MA HS LS 2-1. Ecosystems: Interactions, Energy and Dynamics Analyze data sets to support explanations that biotic and abiotic factors affect ecosystem carrying capacity

MA HS-ESS3-5. Analyze results from global climate models to describe how forecasts are made of the current rate of global or regional climate change and associated future impacts to Earth systems.

Unit Goals

Students will understand the causes and effects and possible solutions of climate change with an emphasis on carbon sequestration (carbon capture)

Lesson Objectives & Essential Vocabulary

Students will identify and describe abiotic factors that affect global climate.

Essential vocabulary:

- Solar Energy
- Radiated Heat
- Latitude
- Altitude
- Ocean Currents
- Wind Currents
- Greenhouse Gases
- Abiotic Factors
- Biotic Factors
- Precipitation

- Temperature
- earth's tilt

Note any potential barriers to the lesson — consider variability

Vocabulary/reading ability — provide scaffolding, diagrams to clarify text, vocabulary assignments: word splash, read aloud software,etc.

Ability to understand models: provide scaffolding with simple models/graphs and discuss

Misconception that greenhouse gases are negative: solve with teacher/class discussion

Evaluation/Assessment

(directly linked to the goals, i.e., Formative/Ongoing Assessment or Summative/End of Lesson Assessment)

Demonstrate a working knowledge of the abiotic factors and models that affect climate

Teacher check-ins for understanding

Vocabulary quiz, vocabulary exercises (see word web link in materials), addition of climate factors to large group, small group google slide/poster, etc. presentation

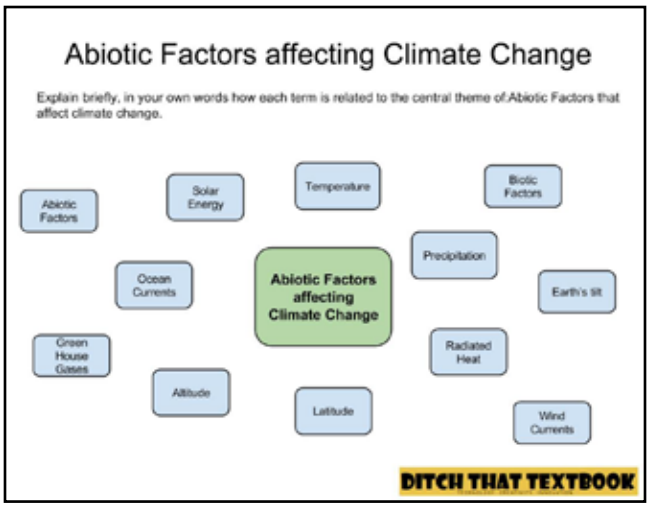
Analysis questions from graph/model interpretation

Compare and contrast local biome to project biome (in written form, picture form, etc.)

NOTE: Consider the UDL Guidelines in selecting methods and materials to ensure that you provide options for engagement, representation, and action and expression.

Methods

(e.g., Anticipatory Set, Introduce and Model New Knowledge, Provide Guided Practice, Provide Independent Practice)



1. Preteach vocabulary and activate prior knowledge: Word web below can be used to help with vocab pre-teaching. *https://docs.google.com/drawings/d/1ENYMrewQcNELoYynlLX5wBBvqPnOFxGbBB_znb-md94/edit?usp=sharing*
2. Teacher will introduce lesson by brainstorming what factors affect climate with students (taps into prior knowledge) class will arrive at a working list of factors (*students could work in groups or individually listing factors on post-it notes or a poster paper then come together as a class to compare notes and arrive at the working list of factors) List should include: solar energy, radiated heat, latitude, ocean currents, wind currents, precipitation, temperature, earth's tilt
   A. Nike sneaker exercise for ocean currents: *http://www.cosee-west.org/oceanglobe/pdf/nike_invest.pdf* (provide print, read aloud, etc.)

3. Next, teachers provide groups students with models and aid in student interpretation *(for enrichment, students could use data to produce their own graphs)* Gulf of Maine buoys provide useable live data, also see Wood's Hole data sites * *see materials for Woods Hole data link*s

4. Students will add models of abiotic climate factors to their biome to the google slide/poster presentation they began in lesson 1
5. Students will use a compare & contrast template to compare and contrast local climate to the climate of their biome. Students can show understanding of factors that affect climate: in written form, verbally, graphically (ex. bar graph) a graphic organizers, word banks can be used to scaffold

Materials

A. Text materials Miller & Levine Biology chapter 4: Climate but any Biology or environmental science text would suffice
B. access to online research (chromebooks, laptop cart, library/media center). Online pics of climate models,
C. Lesson 2 vocabulary word web: *https://docs.google.com/drawings/d/1ENYMrewQcNELoYynlLX5wBBvqPnOFxGbBB_znb-md94/edit?usp=sharing*
D. Video on factors affecting climate *https://vimeopro.com/user22707415/lowern*
E. Nike sneaker exercise for ocean currents: *http://www.cosee-west.org/oceanglobe/pdf/nike_invest.pdf* (provide print, read aloud, etc.)
F. For data links from Wood's Hole, google: The Globe Project, Ameriflex and Euroflex sites
G. *ADD Link to Gulf of Maine Buoys

Notes and Comments

Can reinforce vocabulary with a variety of methods like: crossword puzzle, word splash, Kahoot, classroom discussion, word wall, etc.