

NASAClimate Module with a Student Climate Challenge

What is our climate?

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WCRESA

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1. Grade Level and Usage: This module was created by Amanda Laidlaw at John Glenn High School for use in 11th and 12th grade Chemistry Courses.
2. Title: NASA Climate Module with a Student Climate Challenge
3. Driving Questions:
 1. Why do you think it is important to understand local climate and its change?
 2. How would you describe our climate to your family?
 3. How do scientists use models to predict future climate and change?
 4. How does our government (NASA) help your understanding?
 1. Question – Why do I need to understand climate?¹
 2. Problem – How do I know what my climate is and if it has changed?²
4. Major Understandings:
 1. Climate Literacy: The Essential Principles of Climate Science
 1. The Sun is the Primary Source of Energy for Earth's Climate System.
 2. Climate is regulated by complex interactions among components of the Earth System.
 3. Life on Earth depends on, is shaped by, and affects climate.
 4. Climate varies over space and time through both natural and man-made processes.
 5. Our understanding of the climate system is improved through observations, theoretical studies, and modeling.
 6. Human activities are impacting the climate system.
 7. Climate change will have consequences for the Earth System and human lives.
5. High School Content Expectations and ACT Preparation
(see full .doc or pdf version)
6. Essential content – Students will examine their current understanding of climate and weather then broaden their knowledge by researching different aspects of climate change. Projects will encompass questions such as “How does our climate differ from climates in other areas?” to “What are the ‘catastrophic’ causes of short term climate change?” Students will use internet resources such as GLOBE.gov and the Michigan High School Content Expectations for biology, chemistry, and Earth science. In the end, students will gain a better understanding of

climate and its relevance to their impending adulthood.

7. Student Climate Challenge

Upon completion of the 5E Lesson within which students research our local climate, they will be guided through student research investigations to be completed in small groups (average membership of three).

- These investigations are meant to be fairly open and individualized. After answering the question on page 22, “Climate and Change”, students will be sorted into like-minded groups within their hour.
- If there is an overall interest or theme arising from the class as a whole, I will encourage them to work within their groups and also to consult with their peer groups.
- Students will be presented with cut-out strips with the Michigan High School Content Expectations (see page 5 for master list; provide at least one option per group in each hour) and will then choose a research topic. It may be worthwhile to limit HSCE’s to those related to climate. Sources of topics and resources include:
 - Listed HSCE (page 5)
 - GLOBE Research Investigations (<http://globe.gov/scrc/research>)
 - How does our climate differ from climates in other areas?
 - How is our climate influenced by climate patterns elsewhere?
 - How does local land cover affect climate?
 - Are there any impacts of climate on health issues?
 - My NASA DATA (http://mynasadata.larc.nasa.gov/science_projects.php)
 - Cloud Observations
 - Sky Color
 - Using Cameras
 - Solar Garden
 - NASA Remote Sensing
 - Science Buddies (www.sciencebuddies.org/science-fair-projects/project_ideas.shtml?From=body)
 - Earth and Environmental Science
 - Engineering
 - Journey North (<http://journeynorth.org>)
- Student projects can be used to fit your classroom needs. I have included worksheets used to guide my students in the right direction.

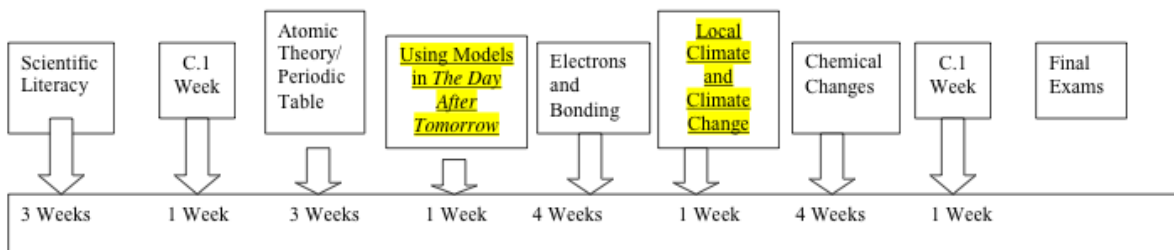
3. Module Calendar (including the pre and post test)

Day	PCE ¹	Tasks
1	10/26	<ul style="list-style-type: none">• Unit: Using Models [in <i>The Day After Tomorrow</i>] to Predict Climate Change• Pre-Test• Engagement Stations
2	10/29	<ul style="list-style-type: none">• <i>The Day After Tomorrow</i>

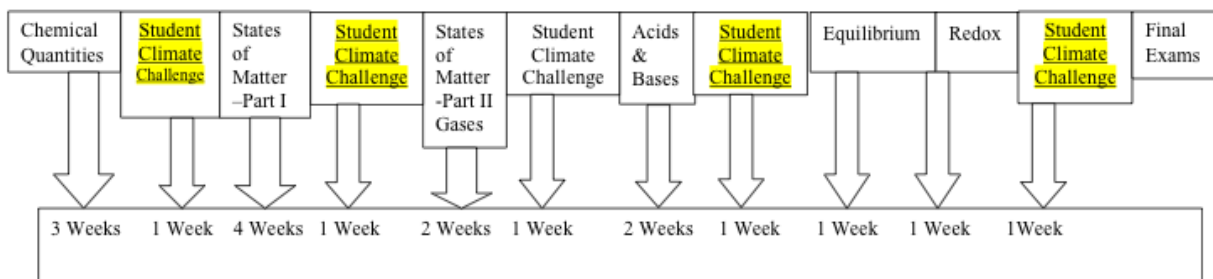
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| 3 | 10/30 | <ul style="list-style-type: none"> • <i>The Day After Tomorrow</i> |
| 4 | 10/31 | <ul style="list-style-type: none"> • Free Write Day |
| 5 | 11/16 | <ul style="list-style-type: none"> • Unit: Local Climate and Climate Change • White Board Engagement Activity |
| 6 and 7 | 11/19 | <ul style="list-style-type: none"> • Exploration of Weather Underground • Draft Data Tables |
| | 11/20 | <ul style="list-style-type: none"> • Placed into groups based on interest during Engagement Stations activity (see Day 4 in Using Models Unit, page 2) • Homework: Complete portion of divided data using agreed upon format • Homework: Worksheet with description prompts |
| 8 | 11/26 | <ul style="list-style-type: none"> • Explanation • Student will plan how to graph data • Homework: Worksheet with assessment prompts |
| 9 | 12/19 | <ul style="list-style-type: none"> • Elaboration Continued • Group discussions about data • Teacher lead discussion about data |
| 10 | 12/21 | <ul style="list-style-type: none"> • Poster Presentations • Homework: Climate and Change worksheet |
| 11 | 3/25 | <ul style="list-style-type: none"> • Student Projects and Challenges • Assign groups based on answers to “Climate and Change”, page 13 of Local Climate Unit • Students plan projects • “Welcome to your Group; Part Two”, page 9 of Climate Module |
| 12 | 4/18 | <ul style="list-style-type: none"> • Student Work Day – each work day is designed as a workshop where different groups can receive individualized help as I walk around the room – if it begins to appear that students do not need additional work days I will cut this timeline short |
| 13 | 4/11 | <ul style="list-style-type: none"> • Student Work Day |
| 14 | 4/24 | <ul style="list-style-type: none"> • Student Work Day |
| 15 | 4/26 | <ul style="list-style-type: none"> • Student Presentations |
| 16 | 4/27 | <ul style="list-style-type: none"> • Student Presentations |

Chemistry Curriculum Timeline

SEMESTER 1



SEMESTER 2



ModuleContents:

- **Unit 1: Using Models [in The Day After Tomorrow]to Predict Climate Change**
Students will be engaged as they are asked a series of driving questions about climate then watch the popular film *The Day After Tomorrow*. They will eventually be asked to describe how scientists in the movie use models to predict future climate and change.
See Unit 1 as [pdf](#).
- **Unit 2: Local Climate and Climate Change**
Students will explore Weather Underground (www.wunderground.com), a data base with over 70 years of daily weather readings as they develop their ability to create data tables and graphs using Excel. Students will explain how our local climate has changed over the past 70 years and predict what it may be 25 years from now. Finally, they will present their findings to their peers in a poster session in class. This unit is designed as a part of the NASA Climate Module, but can be used as a separate unit; simply replace “Day 5” with “Day 1” and proceed.
See Unit 2 as [pdf](#).

