



uBEATS Teacher's Guide:

Introduction to Climate Change

This teacher guide is a supplementary text to support the use of the uBEATS “Introduction to Climate Change” module for grades 6-12.

To help students develop the knowledge necessary for an incredible future in health care, we created UNMC Building Excellence in Academics Through STEM (uBEATS), an online health science resource for Nebraska students.

UNMC uBEATS modules are short (15 minutes or less), interactive online health science modules to supplement curriculum taught in grades 6 – 12. These do not replace curriculum, but they are a supplement for teachers and students incorporating evidence-based information and UNMC expert guided material. Each module is chunked into sections with formative and summative assessments with immediate feedback provided.

Tips on how to utilize uBEATS modules:

Internet access is required to view uBEATS modules.

For those who have access to one-to-one technology, modules can be used in or outside of the classroom as a topic introduction, extension, or review. For classrooms without individual student devices, modules can be used in whole group instruction. Formative assessment questions can use the teacher's preferred call and response method and summative assessment questions can be displayed on the board and answered individually by students or printed and distributed to students after viewing the module.



Objectives

- Define climate drivers (both natural and human-caused), weather, climate change, and climate variability.
- Describe and quantify the role of greenhouse gases in Earth's climate system.
- Explain some major impacts of projected climate change and their corresponding uncertainty.

Introduction

Our planet is vastly different than the one our great-grandparents grew up on. Populations have grown dramatically, as well as our consumption of resources. The chemical composition of the atmosphere has changed. The Earth is warmer. Severe weather is more extreme and occurs more often. Many of these changes happened very quickly over the past 150 years. Still, they were gradual enough for human perception to not fully appreciate the changes that occurred. We are in a changed climate and the climate will continue to change in the future. It is our responsibility to understand those changes and respond to them appropriately.

Prior Knowledge

Before beginning this module, the teacher should understand the Next Generation Science Standards (NGSS) featuring [Three-Dimensional Learning](#).

Core Idea ESS2.D: Weather and Climate. [A Framework for K-12 Science Education](#)



Weather is the minute-by-minute, day-by-day variation of the atmosphere's conditions on a local scale. Scientists record the patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. Climate describes the ranges of an area's typical weather conditions and the extent to which those conditions vary over years to centuries.

National Academies of Sciences, Engineering, and Medicine. 2012. A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Washington, DC: The National Academies Press. <https://doi.org/10.17226/13165>.

Science and Engineering Practices [NGSS](#)

Analyzing and Interpreting data

Crosscutting Concepts [NGSS](#)

Patterns

Key Terms/Vocabulary

Climate, weather, climate driver, climate change, climate variability, Earth's climate system, greenhouse gas, chemical composition, atmosphere, carbon dioxide, water vapor, nitrous oxide, methane, ozone, fossil fuels, radiation, global warming, temperature, precipitation, seasons, biodiversity, land use, natural resource extraction, pollution, invasive species, extermination, desertification, coral bleaching, resilience.

Science Standards

Nebraska's College and Career Ready Standards for Science 2024

[Nebraska Science Standards](#)

Weather and Climate: SC.HS.12

Extensions of the lesson

To help students become more familiar with the Key Terms of this module, the teacher can use the vocabulary list for a classroom Word Wall, or integrate the vocabulary into classroom word games during review sessions.

Encourage students to check current events for the latest news involving climate change and global warming.

As student misconceptions become apparent, the teacher may need to reinforce these important concepts:

- Planet Earth has not changed its size. On the other hand, the human population has increased. For more than 10,000 years the human population was less than 1 billion. Around 200 years ago the number surpassed the 1 billion mark. During the most recent 200 years that number has grown to nearly 8 billion.
- The exponential growth of the human population has affected the use of Earth's natural resources and has changed the composition of Earth's atmosphere.
- The chemical composition of the atmosphere affects global temperature.
- Climate is the behavior of the atmosphere over long periods of time.
- Weather is the minute-by-minute, day-by-day variation of the atmosphere's conditions on a local scale. The weather is extremely variable.
- Climate change can: influence the frequency of severe weather events, affect the length of growing seasons, and lead to biodiversity loss.

Enrichment

The Pew Research Center has surveyed communities in the U.S. to collect data about their perceptions of the problems with climate change. See [Local Impacts](#).

Contact local county offices of [Environmental Services](#) and [Emergency Management](#) to ask about the impact of climate change in your own community.

For classroom activities, see [Climate Change Resources](#).

To learn about possible actions, investigate this site: [Things You Can Do About Climate Change](#).

Look for solutions at [How You Can Stop Global Warming](#).