

COSEE-West Online Workshop: Weather, Sea Level Rise and Climate Change

Lesson Plan Guidelines

Please keep in mind that we would like to post your lesson plan online on the COSEE-West website: <http://www.usc.edu/org/cosee-west/>

FORMAT:

Lesson plans should be submitted as either Word documents or pdfs.

There is no one layout that you need to follow when writing up your lesson plan. However, your lesson plan should have at least the following sections:

- Background
- Content standards (for your state or national standards, or both)
- Lesson plan objectives
- Relevant Vocabulary
- Materials
- Procedures
- Assessment
- Any graphs/charts/student handouts that go along with your lesson plan

Please also include:

Which grade level/band the lesson is targeted at, how much time it should take, and any advanced preparations that are needed.

CITATIONS:

If you create a completely new lesson plan that is your own, great. If you modify your lesson plan from someplace else, please indicate where you got the lesson plan/activity/idea.

I. Background

Unit designed for Integrated Science, 8th Grade.

This unit and its lessons will be spread throughout the entire 8th grade year, with the introductory portions: introducing students to data collection and recording during the first two weeks of school.

II. DoDEA Content Standards

S1 Scientific Inquiry: The student demonstrates abilities necessary to do scientific inquiry and an understanding about scientific inquiry; that is, the student:

S1a: develops research questions that can be answered through scientific investigations

S1b: accesses, evaluates and uses information from a variety of reliable scientific sources

S1c: designs, conducts and records scientific investigations following the general procedures of scientific inquiry

S7 Earth & Space Sciences: The student demonstrates a conceptual understanding of the Earth's systems and history; that is, the student:

S7c: Evaluates the impact of changes in the atmosphere and hydrosphere on weather, climate, and landforms

S7c1: distinguishes between weather and climate

S7c2: demonstrates how global temperature changes in the atmosphere and oceans influence local, regional and global weather

III. Lesson Objectives (“Big Questions”)

The students should exit the unit able to discuss the questions, “Are there external (to the climate/ecology) factors that result in the climate of the planet changing in such a way that the average temperature rises over a large portion of the environment? Can they be identified from changes in weather patterns?” as well as “Does temperature change reflect or signal a climatic change of 1 month, 1 year, 5 years 10 years or does the climatic change reflect the temperature change?”

IV Guiding Questions

1. What is Weather? What is Climate?
2. What are some causes of atmospheric warming? What are some of the signs of atmospheric warming?
3. Can we measure temperature change?
4. Are there internet resources that we can use to track wide-area temperature variations?

V. Vocabulary

Temperature

Precipitation

Wind velocity
Wind direction
Relative Humidity
Hydrometer
Anemometer
Regional climate
Global climate
Jet Stream
Trade winds

VI Performance Tasks (and Assessments)

1. Students will measure temperature, RH, wind direction, wind speed, and cloud cover/precipitation. **Measure of success: accurate (within $\pm 2\%$ of instrument accuracy).**
2. Students will record measurement every morning prior to the first bell, immediately after lunch bell, and immediately after dismissal bell. Data will be recorded in student developed Excel spreadsheet. **Measure of success: data recorded in a format that can be graphed and analyzed at the conclusion of the research portion of the unit.**
3. Student research groups will use web search tools to identify a weather data site with archival data, and from their identified site each group will select four different weather stations at a range of 50 km, 150 km, 250 km, and 500 km from the school. Note: groups may locate the same web site and my incidentally select the same weather reporting station. Using their selected site, students will gather historical data including monthly average high and low temperatures from the past 10 years, wind direction/speed trends, and cloud/precipitation trends for the same period. **Measure of success: data collected and recorded in Excel spreadsheet for graphing and analysis.**
4. Student groups develop presentation (Flash, Captivate, digital video, models, PowerPoint, etc.) to demonstrate their collected data and to support their hypothesis for weather trends. **Measure of success: class/student developed rubric to evaluate presentation effectiveness and thoroughness. (rubric developed in class in March/April time frame so they have it before they begin developing analysis. Rubric is evaluated by students and teachers together.**

VII Learning Activities (lessons that make up the unit)

1. Introduce students to the concept of weather observation using television broadcasts, internet weather sites, a field trip to the Met office on base, and direct observation of the weather conditions. This lesson will take up 3-4

- lesson periods with the culminating activity the field trip to observe meteorologists in action at the Met office.
2. Move students from passive observation using the tools introduced in lesson 1 to active observation. Introduction of this lesson will take 1-2 lesson periods, continuation of the lesson will involve before- and after- class work throughout remainder of school year.
 - a. Will need introduction into concept of temperature, Relative Humidity, measuring relative humidity, daily wind patterns, and seasonal weather patterns.
 - b. Have student teams practice observing and recording data in provided Excel spreadsheets. Part of this activity will include basic Excel operations including using statistical functions and datasheet formatting.
 - c. Assign student teams responsibility for:
 - i. recording local weather on a weekly basis, and
 - ii. recording remote weather data (identified stations, as above) on a weekly basis.
 3. Mapping and analysis of recorded data (to take place in May-June time frame as a unit/course wrap-up).
 - a. Student teams will develop a summary Excel sheet for each weather station data recorded. This summary sheet will provide monthly averages for Morning, Mid-day, and Afternoon for local temperatures and High and Low averages for remote temperatures; average wind speeds, prevalent wind directions; average RH measurements, and average barometer measurements for the month.
 - b. As a class, the monthly summary sheets will be consolidated and graphed as well as charted on a regional map for each month.
 - c. Student teams will gather historical data on local and remote stations (as available) and then develop a graph for each local and remote station that shows 1) temperature trends over the 10-year period; 2) wind direction and speed trends; 3) barometric pressure trends; and 4) trends in atmospheric water (RH).
 - d. Divide class into teams (as appropriate) and guide groups to analyze the trends graphed in B and C, above. Students should look for the trends and try and discern which of those trends are indicative of climatic change. Hypothesize reasons for any changes observed and see if external research will support those hypotheses.

VIII. Materials

1. Weather observation tools (digital weather station if possible, otherwise simple measurement tools including Dry/Wet Hydrometer, Anemometer, wind sock, and barometer.
2. Excel spreadsheet developed in class by student/teacher collaboration to record data
3. Access to internet for distant data recording.