

ESCI-1040: WEATHER STUDIES

Cuyahoga Community College

Viewing: ESCI-1040 : Weather Studies

Board of Trustees:

2014-03-20

Academic Term:

2014-08-25

Subject Code

ESCI - Earth Science

Course Number:

1040

Title:

Weather Studies

Catalog Description:

An integrated science course that covers current facts, theories, and technological methods regarding the study of the weather and climate. Weather prediction and real-time weather data analyses are important facets of this course.

Credit Hour(s):

3

Lecture Hour(s):

2

Lab Hour(s):

2

Requisites

Prerequisite and Corequisite

ENG-0990 Language Fundamentals II, or appropriate score on English Placement Test.

Outcomes

Course Outcome(s):

Apply knowledge of weather for practical applications including green energy generation, and interpreting the effects of the atmosphere on our natural and human ecosystems.

Essential Learning Outcome Mapping:

Information Literacy: Acquire, evaluate, and use information from credible sources in order to meet information needs for a specific research purpose.

Objective(s):

1. Increase awareness of potential impact of changes of weather on human existence.
2. Define important meteorological terminology pertaining to the course as outlined by the instructor.
3. Describe the structure of the Earth's atmosphere.
4. Explain a theory of the origin of the earth's atmosphere.
5. Explain how the seasons occur.
6. List and define the different types of heat transfer.
7. Identify and read the different types of instruments for measuring temperature, air pressure, wind speed, humidity, and precipitation and be able to chart them on a weather station model.
8. Describe how land forms can modify or alter global weather conditions.
9. Draw and explain the hydrologic cycle.
10. Calculate relative humidity and dew point temperature.
11. Describe the structure and composition of the atmosphere.
12. Explain temperature inversion.
13. List the types and sources of anthropogenic air pollution.
14. Explain how clouds are formed and identify the major cloud types.

15. Explain the Bergeron and collision-coalescence process as processes of precipitation formation.
16. Explain how different air pressures occur.
17. Explain the Coriolis effect and how it affects global weather patterns and wind directions.
18. Explain the cause of the westerlies.
19. Explain and list the different types of local winds.
20. Locate and identify the different air masses source regions.
21. Identify various weather patterns.
22. Explain how different weather fronts are formed.
23. Explain how a wave cyclone develops.
24. List and describe the stages of thunderstorm development.
25. Explain how lightning and thunder are produced.
26. Explain the atmospheric conditions that might develop a tornado.
27. Explain how Doppler radar works with an approaching tornado.
28. Explain how a hurricane is formed.
29. Read and interpret weather symbols from a station model and weather map.
30. Read meteorological data from a weather chart.
31. Explain theories of how the earth's climate is changing due to increase in carbon dioxide, particulate matter, and a variable sun.
32. Use knowledge of weather patterns to forecast weather.
33. Explain theories of how different regions' climates are changing.
34. List the different climatic classifications.
35. List and/or explain the natural controls of climate.
36. Write lab reports using Standard English.
37. Research and present a meteorological topic of their choice.
38. Identify types of air masses.
39. Predict the influence and impact of air masses on humans and the environment.
40. Interpret real-time weather maps.
41. Describe the factors that affect climate.
42. Manipulate laboratory materials to investigate weather phenomenon.

Course Outcome(s):

Apply knowledge of the effects various human activities have upon weather and the global system.

Objective(s):

1. Increase awareness of potential impact of changes of weather on human existence.
2. Describe the structure and composition of the atmosphere.
3. Explain how fog and smog occur.
4. Identify various weather patterns.
5. Use knowledge of weather patterns to forecast weather.
6. Explain the causes of the ozone hole and its effect upon life.
7. Describe the causes and effects of the Earth's Greenhouse effect
8. Identify types of air masses.
9. Predict the influence and impact of air masses on humans and the environment.
10. Interpret real-time weather maps.
11. Describe the factors that affect climate.
12. Manipulate laboratory materials to investigate weather phenomenon.

Methods of Evaluation:

1. Essays
2. Quizzes
3. Article reviews
4. Discussion forums
5. Critical thinking questions
6. Exams
7. Laboratory investigation experiments

Course Content Outline:

1. Meteorological Terminology
2. Atmosphere
 - a. Structure
 - b. Composition
 - c. Theory of Origin
3. Weather patterns

- a. Types of air masses
 - b. Source regions for air masses
 - c. Weather fronts
 - d. Thunderstorms
 - i. Lightning formation
 - ii. Thunder formation
 - e. Wave Cyclones
 - i. Tornadoes
 - 1. Atmospheric conditions
 - 2. Doppler radar
 - f. Hurricanes
 - g. Factors that affect climate
 - h. The seasons
 - i. Air pressure
4. Hydrologic Cycle
- a. Heat transfer
 - b. Cloud formation
 - c. Major cloud types
 - d. Bergeron: Collision-coalescence process
 - e. Relative humidity
 - f. Dew point temperature
 - g. Temperature inversion
5. Wind
- a. Coriolis effect
 - b. Westerlies
 - c. Local Winds
 - i. Synoptic
 - ii. Gradient
 - iii. Prevailing
 - iv. Geostrophic
6. Weather measurement
- a. Temperature
 - b. Air pressure
 - c. Wind speed
 - d. Humidity
 - e. Precipitation
 - f. Weather station model
7. Climate
- a. Factors that impact climate
 - b. Theories of climate change
 - c. Climatic classifications
 - d. Natural controls of climate
8. Global Weather conditions
- a. Impact of Land forms
 - b. Impact of Air masses on humans and environment
 - c. Impact of potential changes on human existence
 - d. Impact of human activities upon global weather system
9. Weather Prediction
- a. Weather maps & charts
 - i. Symbols
 - ii. Isobars
 - iii. Identifying air pressure patterns
 - iv. Identifying direction of surface winds
 - v. "hand-twist" model of wind direction
 - vi. Front movement & surrounding weather
 - b. Meteorological data
 - c. Station model

- d. Doppler radar
- e. Weather satellite imagery

Resources

American Meteorological Society. *Weather Studies*. 5th ed. Boston: American Meteorological Society., 2010.

American Meteorological Society. *2012-13 Weather Studies: Investigations Manual 2012-2013 and Summer 2013*. Boston: American Meteorological Society, 2012.

Resources Other

1. American Meteorological Society Weather Studies course website: <http://www.ametsoc.org/amsedu/online/info/overviewframes.html>

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