Common Course Outline
ERSC 131
Meteorology
4 Semester Hours

The Community College of Baltimore County

Description

Meteorology
Discusses weather and climate with emphasis on the physical principles underlying the movement and processes occurring in the earth's atmosphere; explores radiation and atmospheric heating, global circulation, weather systems, fronts and air masses, cloud physics, local weather, and other topics in applied and aviation meteorology.
Prerequisite: (RDNG 052 or LVR 2, ENGL 052 or LVE 2, MATH 082 or LVM 2).

Overall Course Objectives

Upon completion of this course the student will be able to:

[1] Draw a diagram of the structure of the atmosphere; label all of the layers and transition zones and identify pertinent physical and chemical characteristics (I, III, VII: 1, 2, 7)

[2] Explain the how the sun's energy warms the earth and explain how that energy distribution varies geographically; explain what impact the distribution of sunlight has on the development of climates (I, II, III, VII: 1, 2, 6,7)

[3] Draw the hydrologic cycle and explain the heat exchange process (I, II, VII: 1, 2, 6)

[4] Explain the concept of stability and how it relates to atmospheric dynamics; given a set of atmospheric data (temperature, pressure, humidity) evaluate the condition of the atmosphere and determine its stability (I, II, IV: 1, 2, 3, 4, 5, 6, 7)

[5] Identify the major cloud types, give their characteristics, and explain what they indicate about the weather (I, II, IV, VII: 1, 2)

[6] Explain how the process of evaporation and condensation occur and what relationship they have to atmospheric heating and cooling; explain how the distribution of precipitation on a local, regional, and global scale affect climatic development (I, II, VII: 1, 7)

[7] Explain how precipitation develops and occurs and what the different types of precipitation are; given a set of atmospheric data (temperature, pressure, humidity), analyze the current conditions and evaluate the probability of precipitation developing(I, II, VII: 1, 7)

[8] Explain what the adiabatic process is, how it develops, and what its effects are on the atmosphere and identify its effects on different regions of the world (I, II, V, VII: 1, 2, 3, 4, 5, 6, 7)

[9] Identify the small scale circulation systems present on the globe and explain how they develop. Provide examples of these circulation systems throughout the globe; evaluate how the local weather systems have affected the inhabitants and their lives (I, II, V, VII: 1, 4, 6, 7)

[10] Individually, and as a group, graph a time-series of atmospheric data (temperature and rainfall) for any climate in the world and evaluate how the different atmospheric variables interact (II, III, IV, VI, VII: 1, 2, 3, 4, 5, 6, 7)
[11] Given an atmospheric chart (radar summary, 500 mb, surface chart, etc) read the data and interpret it (I, II, II, VI, VII: 2, 3, 4, 5, 6)
[12] Draw the global circulation system and locate the global high and low pressure centers; explain the role that these wind and pressure systems have played in the history of development and change in different civilizations and cultures (I , VII: 1, 3, 5)
[13] Explain the process of cyclogenesis and explain what is meant by barotropic and baroclynic instability (I, VI, VII: 1, 3, 5)
[14] Explain how a thunderstorm develops; given a time-series of atmospheric data (temperature, pressure, humidity) evaluate the probability of a thunderstorm developing (I, II, VII: 1, 5, 6, 7)
[15] Explain how a tornado develops; given a time-series of atmospheric data (temperature, pressure, humidity) evaluate the probability of a tornado developing (I, II, VII: 1, 5, 6, 7)
[16] Explain how a hurricane develops; given a time-series of atmospheric data (temperature, pressure, humidity) evaluate the probability of a hurricane developing (I, II, VII: 1, 5, 6, 7)
[17] Explain how wind develops and what purpose it serves (I, II, III, VI, VII: 1, 2, 5, 6, 7)
[18] In small groups, given a series of meteorological charts, present an assessment of the current weather and predict the changes in the atmosphere and weather for a 48 hour period (I, II, III, VI, VII: 1, 2, 5, 6, 7)
[19] Identify the primary sources of air pollution and calculate their increase through time and develop projections for future change (I, II, III, VI: 1, 2, 5, 6, 7)
[20] Explain the difference between point source and non-point source pollutants and how both affect local weather (I, II, VII: 1, 5, 6, 7)
[21] Explain how the weather of an urbanized area differs from a non-urbanized area (I, II, VII: 1, 5, 6, 7)
[22] Explain how acid fog, acid rain, etc. develop, identify their impact, and provide examples. (I, II, VII: 1, 5, 6, 7)
[23] Describe how the climate of the earth has changed since its inception and evaluate the possibilities of further global change. (I, II: 1, 5)
[24] Given the historical changes in global climate, explain how we can predict future changes and what those future changes might be (I, II: 1, 5, 6, 7)
[25] Explain how the climatic phenomena El Nino/La Nina and the Greenhouse Effect have developed and what impact they have on the different geographic regions of the globe (I, II, III. VII: 1, 5, 6, 7)
[26] Identify the 5 dominant climate types and describe their characteristics; given a map of the globe, map the extent of each of the major climate types; evaluate the impact that the different climate types and their distribution have had on local and regional development (I, II, III, IV, VII: 1, 5, 6, 7)

Major Topics

I. The Earth and its Atmosphere
II. Energy Distribution
III. Seasonal and Daily Temperatures
IV. Light, Color, and Atmospheric Optics
V. Atmospheric Moisture
VI. Condensation: Dew, Fog, and Clouds
VII. Stability and Cloud Development
VIII. Precipitation
IX. The Atmosphere in Motion
X. Small Scale Wind Systems
XI. Global Wind Systems
XII. Air Masses and Fronts
XIII. Middle Altitude Cyclones
XIV. Weather Forecasting
XV. Thunderstorms and Tornadoes
XVI. Hurricanes

Course Requirements (VII)

Through a variety of learning experiences including lecture, class discussion, audio-visual material, the World Wide Web, interactive CD-roms, computer assignments, WebCt, textbooks and lab exercises the students will, independently and collaboratively, observe and evaluate the earth and its environs.

Students will be expected to demonstrate learning through the following:

1. A minimum of 3 in class exams and 1 lab exam.
2. A minimum of 5 quizzes to cover class and lab material
3. A minimum of 5 lab exercises and formal write-ups
4. Participation in class discussions, and at least one oral presentation and/or collaborative report

Other Course Information

This course is a _____core course and a _____ elective.
This course is taught in a computerized environment.