



# El Camino College

## COURSE OUTLINE OF RECORD - Official

### I. GENERAL COURSE INFORMATION

**Subject and Number:** Geography 9  
**Descriptive Title:** Weather and Climate

**Course Disciplines:** Earth Science  
or Geography

**Division:** Natural Sciences

**Catalog Description:** This course is a survey of the causes and regional distribution of the Earth's weather and climate. The content includes the atmosphere, cause of seasons, air temperature, air pressure and wind, clouds and precipitation, and storms. Use of weather instruments and weather data interpretation are also covered.

**Conditions of Enrollment:** Recommended Preparation  
English 82

**Course Length:**  Full Term  Other (Specify number of weeks):  
**Hours Lecture:** 3.00 hours per week  TBA  
**Hours Laboratory:** 0 hours per week  TBA  
**Course Units:** 3.00

**Grading Method:** Letter  
**Credit Status:** Associate Degree Credit

**Transfer CSU:**  Effective Date: Prior to July 1992  
**Transfer UC:**  Effective Date: Fall 2001

**General Education:**  
**El Camino College:** 1 – Natural Sciences  
Term: \_\_\_\_\_ Other: Approved

**CSU GE:** B1 - Physical Science  
Term: \_\_\_\_\_ Other: Approved

**IGETC:** 5A - Physical Science without Lab  
Term: \_\_\_\_\_ Other: Approved

## II. OUTCOMES AND OBJECTIVES

### **A. COURSE STUDENT LEARNING OUTCOMES (The course student learning outcomes are listed below, along with a representative assessment method for each. Student learning outcomes are not subject to review, revision or approval by the College Curriculum Committee)**

1. Students can identify the salient features of the basic concepts of meteorology and climate science. This includes the ability to recall the definitions of the specialized vocabulary of meteorology and climate science.
2. Students recognize and can accurately articulate how weather and climate affect humans' lives and how human activities affect weather and climate.
3. Students can identify the key elements of the scientific method (hypotheses, tests, observations, conclusions/interpretation of observations) in popular accounts of scientific research in magazines, newspapers, etc.

The above SLOs were the most recent available SLOs at the time of course review. For the most current SLO statements, visit the El Camino College SLO webpage at <http://www.elcamino.edu/academics/slo/>.

### **B. Course Student Learning Objectives (The major learning objective for students enrolled in this course are listed below, along with a representative assessment method for each)**

1. List and describe the basic elements of weather and climate.  
Quizzes
2. Discuss the different layers in the atmosphere and the importance of water vapor, carbon dioxide, dust, and ozone.  
Quizzes
3. Describe and explain the importance of radiosondes and meteorological satellites.  
Multiple Choice
4. Explain air pressure and describe the use of mercurial and aneroid barometers.  
Essay exams
5. Explain the causes of the changes of seasons.  
Multiple Choice
6. Distinguish between heat and temperature, and describe how heat is transferred.  
Multiple Choice
7. Explain the controls of air temperature, and describe the measurement of air temperature including the Fahrenheit and Celsius scales, maximum and minimum thermometers, and the weather instrument shelter.  
Essay exams
8. Describe and explain the importance of air temperature inversions.  
Essay exams
9. Compare and contrast anticyclones and cyclones, and the typical weather associated with each.  
Multiple Choice
10. Illustrate and explain the horizontal pressure gradient, the pressure gradient force, and the relationship between the spacing of isobars and wind speed.  
True/False

11. Describe and explain the effect of the Coriolis force on wind.

True/False

12. Sketch, label, and explain a diagram showing the general distribution of air pressure and major wind systems on the earth.

Homework Problems

13. Describe and explain upper-level airflow including geostrophic and gradient winds, and its importance to surface weather conditions and to modern weather forecasting.

Multiple Choice

14. Describe and explain the formation of the summer and winter monsoons, and the sea breeze and land breeze.

Homework Problems

15. Describe the hydrologic cycle.

Multiple Choice

16. Illustrate and explain the changes of state of water and the different types of latent heat.

Essay exams

17. Distinguish among the different expressions of humidity, and demonstrate the use of the sling psychrometer with respect to determining relative humidity and dew point.

Homework Problems

18. Discuss the role of condensation nuclei in cloud formation.

Matching Items

19. Compare and contrast the dry and wet adiabatic temperature lapse rates.

Multiple Choice

20. Describe the different types of stability, associated weather, and the factors that determine whether air is stable or unstable.

Essay exams

21. List and describe the different types of clouds and fog and how they form.

Multiple Choice

22. Describe the Bergeron and Collision Coalescence Processes and how rain, snow, sleet, and hail form.

Multiple Choice

23. Explain the instruments that are used to measure precipitation.

Essay exams

24. Illustrate the ways by which air is lifted, commonly resulting in the formation clouds and precipitation.

Written homework

25. Explain the world distribution of precipitation in the low latitudes, subtropics, middle latitudes, and high latitudes.

Essay exams

26. Compare and contrast the formation and characteristics of thunderstorms, tornadoes, and hurricanes.

Multiple Choice

27. Describe air mass classification and the different air masses, emphasizing the air masses that affect North America.

Multiple Choice

28. Identify and explain the structure and weather associated with a cold front and a warm front.

Multiple Choice

**III. OUTLINE OF SUBJECT MATTER (Topics are detailed enough to enable a qualified instructor to determine the major areas that should be covered as well as ensure consistency from instructor to instructor and semester to semester.)**

Lecture or Lab	Approximate Hours	Topic Number	Major Topic
Lecture	3	I	Composition and Vertical Structure of the Atmosphere A. Atmospheric Composition, Moisture, Temperature, Pressure B. Weather versus Climate C. The Science of Meteorology D. Homosphere and Heterosphere E. Ozonosphere and Ionosphere F. Water vapor, Carbon Dioxide, Dust, and Ozone
Lecture	3	II	The Use of Radiosondes and Meteorological Satellites A. Supercomputers B. Plots C. Weather Maps
Lecture	3	III	Measurement of Air Pressure A. Mercurial and Aneroid Barometers B. Isobarometric Maps C. Introduction to Wind
Lecture	3	IV	Earth-Sun Relationships and the Causes of Seasons A. Solstices and Equinoxes 1. The Changes of the Seasons 2. Angle of Incidence and Insolation
Lecture	3	V	Air Temperature and Heat A. Heat versus Temperature B. Mechanism of Heat Transfer C. Surface Albedo
Lecture	3	VI	Air Temperature A. Measurement of Air Temperature 1. Fahrenheit and Celsius scales 2. Maximim and Minimum Thermometers 3. Weather Station Instruments B. Adiabatic Process and Environmental Lapse Rate 1. Wet versus Dry Lapse Rates 2. Condensation and Precipitation Outcomes
Lecture	3	VII	Air Quality A. Geographical Patterns and Distribution over Time B. Criteria Pollutants and their Effects C. Wind Roles D. Temperature Inversions E. Air Quality Management District (AQMD) and Mitigation
Lecture	3	VIII	Air Pressure A. Horizontal Pressure Gradient 1. Pressure Gradient Force 2. Spacing of Isobars and Wind Speed B. Global and Local Winds

Lecture	3	IX	Coriolis Effect A. Effect on the Force of Wind B. Cyclonic and Anticyclonic Flow in each Hemisphere
Lecture	3	X	Winds A. Polar Jet Stream B. Summer and Winter Monsoons C. Land and Sea Breezes
Lecture	3	XI	Hydrologic cycle A. Changes of State B. Types of Latent Heat C. Types of Humidity and Measurement
Lecture	3	XII	Adiabatic Process A. Adiabatic Temperature Changes B. Stable and Unstable Air C. Associated Weather Patterns
Lecture	3	XIII	Condensation and Precipitation Outcomes A. Clouds B. Fog C. Formation of Precipitation D. Types of Precipitation E. Measurements of Precipitation
Lecture	3	XIV	Precipitation A. Bergeron and Collision-Coalescence Processes B. Types of Precipitation 1. Rain 2. Snow 3. Sleet 4. Glaze 5. Hail C. Precipitation Measurement 1. Instrumentation a. Rain Gauges b. Radiosondes c. Tipping Bucket d. Snow Pillow 2. Interpretation a. Weather maps and plots
Lecture	3	XV	Atmospheric Disturbances: Formation, Modeling, Prediction, Distribution, Risks A. Thunderstorms B. Tornadoes C. Hurricanes
Lecture	3	XVI	Air Masses and Frontal Systems A. Air Mass Formation B. Air Mass Classification C. Associated Weather Conditions with each Air Mass D. Structures and Types of Fronts E. Associated Weather Conditions with different Fronts
Lecture	3	XVII	Anticyclones and Cyclones A. Geographical Patterns and Rotation B. Typical Weather C. Midlatitude Cyclones
Lecture	3	XVIII	Climate A. Measurement of Climate 1. Climographs 2. Interpretation

		3. Construction B. Koppen Climate Classification 1. Temperature 2. Precipitation 3. Vegetation C. Distribution of Climates Globally D. Interpretation of Climates with Photographic and Station Data E. Climate Change 1. The Future and Consequences of Climate Change 2. Intergovernmental Panel on Climate Change (IPCC) and Mitigation 3. Possible Predictions a. Populations Growth b. Use/Exploitation of Resources
<b>Total Lecture Hours</b>	54	
<b>Total Laboratory Hours</b>	0	
<b>Total Hours</b>	54	

#### IV. PRIMARY METHOD OF EVALUATION AND SAMPLE ASSIGNMENTS

##### A. PRIMARY METHOD OF EVALUATION:

Substantial writing assignments

##### B. TYPICAL ASSIGNMENT USING PRIMARY METHOD OF EVALUATION:

The final paper/project allows the student to pick one of three topics:

- 1) Albedo measurement of 6 different surfaces (3 natural, 3 artificial) and interpretation of the results given the conditions of the temperature readings.
- 2) Nine cloud photographs are taken over a period of time. The clouds are identified and their formation process explained.
- 3) Data on urban air quality and wind conditions over a period of time are collected, then interpreted to look for a relationship.

##### C. COLLEGE-LEVEL CRITICAL THINKING ASSIGNMENTS:

1. On a map of the Earth, draw and name the major surface wind systems using the locations of the major areas of high and low pressure on the earth, the Coriolis effect, and how wind direction is described.
2. Given the normal temperature lapse rate, the surface air temperature, and the dry and wet adiabatic temperature lapse rates, determine the altitude of the cloud base, the dew point, and whether the rising air is stable or unstable at different altitudes. Show your work in the space provided.

#### **D. OTHER TYPICAL ASSESSMENT AND EVALUATION METHODS:**

Other exams

Quizzes

Reading reports

Written homework

Homework Problems

Term or other papers

Multiple Choice

Completion

Matching Items

True/False

#### **V. INSTRUCTIONAL METHODS**

Demonstration

Discussion

Lecture

Multimedia presentations

**Note: In compliance with Board Policies 1600 and 3410, Title 5 California Code of Regulations, the Rehabilitation Act of 1973, and Sections 504 and 508 of the Americans with Disabilities Act, instruction delivery shall provide access, full inclusion, and effective communication for students with disabilities.**

#### **VI. WORK OUTSIDE OF CLASS**

Study

Required reading

Written work

**Estimated Independent Study Hours per Week: 6**

#### **VII. TEXTS AND MATERIALS**

##### **A. UP-TO-DATE REPRESENTATIVE TEXTBOOKS**

Aguado, Edward, and Burt, James E.. Understanding Weather and Climate. 6th ed. Prentice-Hall, 2012.

##### **B. ALTERNATIVE TEXTBOOKS**

##### **C. REQUIRED SUPPLEMENTARY READINGS**

##### **D. OTHER REQUIRED MATERIALS**

#### **VIII. CONDITIONS OF ENROLLMENT**

##### **A. Requisites (Course and Non-Course Prerequisites and Corequisites)**

Requisites	Category and Justification
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**B. Requisite Skills**

Requisite Skills
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**C. Recommended Preparations (Course and Non-Course)**

Recommended Preparation	Category and Justification
Course Recommended Preparation English-82	

**D. Recommended Skills**

Recommended Skills
<p>There is sufficient reading requirements to be successful in this course. ENGL 82 - Identify at the paragraph level the topic sentence, supporting details, transitions and patterns of organization of short reading selections.</p> <p>ENGL 82 - Expand vocabulary through use of dictionary, study of word parts, and skilled use of context clues.</p> <p>ENGL 82 - Employ basic study skills and reading strategies to explain at the literal level the content of a text.</p> <p>ENGL 82 - Employ basic critical thinking skills such as distinguishing fact from opinion, making valid inferences, and formulating implied main ideas.</p>

**E. Enrollment Limitations**

Enrollment Limitations and Category	Enrollment Limitations Impact
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**Course created by W. Ford on 11/01/1966.**

**BOARD APPROVAL DATE:**

**LAST BOARD APPROVAL DATE:**

**Last Reviewed and/or Revised by Julienne Gard on 03/12/2015**