Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by: Cindy Nance **Date:** 12/17/2019

Department	Subject	Course Number	Title
Geography	Geography GEOG	106	Introduction to Weather and Climate

Units/Hours

Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
Each laboratory unit requires 3 hours per week of class time.
Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units	Total Units
3.00	3.00

Lecture Contact Hours	Total Contact Hours
48.00 - 54.00	48.00 - 54.00

Lecture Homework Hours
96.00 - 108.00

Stand Alone:

Program Applicable

AA/AS Degree General Ed Breadth Area(s):

A NATURAL AND PHYSICAL SCIENCES

General Education Justification:

This course examines the physical universe, its life forms and natural phenomena and encourages understanding of the relationship between weather and climate science and human activities (Area A). Students examine complex issues of energy and mass, hydrology, atmospheric movement and disturbances, climate, and climate change to discover connections and correlations among ideas that advance toward a valid independent conclusion (GELO1). The scientific method is used to analyze real and potential problems, evaluate and test possible solutions to hypotheses of, for instance, changing weather patterns (GELO2). Students analyze and evaluate alternative points of view, for instance, about climate change, and interpret evidence, statements and graphics while debating their validity (GELO3). Students analyze and explain issues quantitatively (GELO4), apply their evolving knowledge about weather and climate to varied situations (GELO5), and employ technology to select tools competently (GELO6).

Maximum Enrollment: 40
Maximum Enrollment

Justification: Justification:

Grading Method: Letter Grade or P/NP

TOP code: 2206.00

Can be Taken 1 **time(s) for credit** (max 4)

- Visual or Performing Arts course that is required to meet major requirements for UC/CSU
- Intercollegiate athletics course
- Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(**75 words** or less in gray box below).

This course introduces students to Earth's atmosphere. Topics include atmospheric structure and composition, solar radiation and energy balances, temperature, seasonal changes, atmospheric moisture, clouds and fog, precipitation, air pressure, winds, air masses and fronts, cyclones, weather forecasting, climate and climate change. Controversial topics-such as climate change - introduce students to potential consequences of a climate and weather system out of balance. A field trip is required.

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(**25 words** or less in gray box below).

This course introduces students to Earth's atmosphere as a system that plays a major role in life on this planet. A field trip is required.

Need for the course:

This course provides in-depth scientific understanding of climate and weather which is only introduced in the other geography courses. This course meets the college mission for a comprehensive geography program and commitment to provide general education that transfers. A Weather and Climate course is an elective for the ADT in Geography. This course is an elective for an AS in Science and Biology and an AA in Liberal Arts: Mathematics and Science.

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details.
(For further clarification, contact the Prerequisite Subcommittee)

-none-

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.

-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.

-none-

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)

Upon the completion of the course the student will be able to do the following:

1. Distinguish between climate and weather.
2. Examine the basic concepts and terms of climate and weather.
3. Analyze the energy balance of the Earth-atmosphere system.
4. Appraise forces that cause atmospheric motion and resultant pressure patterns, wind systems and global circulation.
5. Analyze moisture, clouds and precipitation processes, and their distributions.
6. Categorize weather systems, distribution and extreme events.
7. Classify and interpret atmospheric data through weather maps, radar imagery and satellite data.
8. Differentiate global climate distribution and analyze causes and implications of climate change.
9. Assess the impact of historic to present global climate change on humans and other species.
10. Assess the impact of climate change on economic, political and socio-cultural systems.
11. Debate the cause and effect of changes in weather patterns and climate change.
12. Test hypotheses for possible solutions for prevention or adaptation to extreme weather and climate change.

Course Content:

(please number the outline of main topics and subtopics)

1. Introduction to the Atmosphere
    1. Nature of Scientific Inquiry
    2. Earth as a System
    3. Composition of the Atmosphere
2. Heating Earth's Surface and Atmosphere
    1. Earth-Sun Relationships
    2. Energy, Temperature and heat
    3. Mechanisms of heat Transfer
    4. Incoming Solar Radiation
    5. Gases in the Atmosphere
    6. Earth's Energy Budget
3. Temperature
    1. Cycles of Air Temperature
    2. Temperature Variance
    3. Global Temperature Distribution
    4. Temperature Measurement
    5. Temperature Data
4. Moisture and Atmospheric Stability
    1. Water on Earth
    2. Water's Changes of State
    3. Humidity: Water Vapor in the Air
    4. Relative Humidity and Dew-Point Temperature
    5. Adiabatic Temperature Changes
    6. Processes that Lift Air
    7. Atmospheric Stability
    8. Daily Weather
5. Forms of Condensation and Precipitation
    1. Cloud Formation
    2. Cloud Classification
    3. Types of Fog
    4. Forms of Precipitation
    5. Precipitation Measurement

6. Air Pressure and Winds
    1. Atmospheric Pressure and Wind
    2. Why Does Air Pressure Vary
    3. Factors Affecting Wind
    4. Winds Aloft and Surface Winds
    5. Vertical Air Motion
    6. Wind Measurement
7. Circulation of the Atmosphere
    1. Scales of Atmospheric Motino
    2. Local Winds
    3. Global Circulation
    4. Global Distribution of Pressure and Precipitation
    5. Westerlies
    6. Jet Streams
    7. Global Winds and Ocean Currents
8. Air Masses
    1. Classifying Air Masses
    2. North American Air Masses
    3. Air Mass Modification
9. Midlatitude Cyclones
    1. Frontal Weather
    2. Midlatitude Cyclones and Polar-Fronts
    3. Cyclone Formation
    4. Conveyor Belt Model
    5. Midlatitude Cyclones
10. Thunderstorms and Tornadoes
    1. Thunderstorms
    2. Lightning and Thunder
    3. Tornadoes
    4. Tornado Destruction and Forecasting
11. Hurricanes
    1. Hurricane Formation and Decay
    2. Hurricane Destruction
    3. Tracking and Monitoring Hurricanes
    4. Forecasting Hurricanes
12. Weather Analysis and Forecasting
    1. Acquiring Weather Data
    2. Weather Maps
    3. Weather Forecasting
    4. Weather Satellites
    5. Types of Forecasting
    6. Forecast Accuracy
13. Air Pollution
    1. Types of Air Pollution
    2. Trends in Air Quality
    3. Meteorological Factors
    4. Acid Precipitation
14. The Changing Climate
    1. Climate Change
    2. Detecting Climate Change
    3. Natural Causes of Climate Change
    4. Human Impacts on Global Climate
    5. Predicting Future Climate Change
    6. Consequences of Climate Change

15. World Climates
    1. Climate Classification and Controls
    2. Humid Tropical Climates
    3. Dry Climates
    4. Mild Midlatitude Climates
    5. Midlatitude Climates and Severe Winters
    6. Polar Climates
16. Optical Phenomena of the Atmosphere
    1. Interactions of Light and Matter
    2. Mirages
    3. Rainbows
    4. Halos, Sun Dogs, and Solar Pillars
    5. Auroras
    6. Coronas
    7. Iridescent Clouds

Methods of Instruction:

Methods of instruction may include, but are not limited to the following:

- **Method:** Lecture
  Integration: Lecture and audio-visual presentations introduce students to the concepts and terms of climate and weather.
- **Method:** Field Trips
  Integration: Real world experience through a field trip to a meteorology center or facilities involved with weather measurements, for instance, a local fire station or weather forecast facility.
- **Method:** Discussion
  Integration: Students discuss current weather and climate news in relation to moisture, clouds, precipitation process and their distribution, and weather systems and extreme events while addressing causes and implications of climate change.
- **Method:** Activity
  Integration: Instructor led examination of online weather forecasting (such as WeatherUnderground),3D digital maps (such as Google Earth) and the National Oceanic and Atmospheric Association for an integrated understanding of the forces behind atmospheric motion, pressure patterns, wind systems and global circulation, and classify and interpret these data with weather maps, radar and satellite imagery.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Exams/Tests
  Integration: Quizzes and/or exams comprised of multiple-choice, true or false, matching of terms, or short essays are designed to determine whether students comprehend the various processes that contribute to weather and climate, and are able to describe, explain and classify those processes.
- **Method:** Papers
  Integration: An in-field worksheet focuses students on the field experience as a group and conveys their understanding of the physical processes and terminology of weather and climate, from which each student will be graded individually for their ability to relate what they learned in the field and in class to a real-world weather and climate phenomenon as a short paper.
- **Method:** Class Work
  Integration: In-class activities are graded for student ability to integrate what they learned from lectures and demonstrations of weather and climate, and incorporate other materials that expand upon class topics.
- **Method:** Class Participation
  Integration: In-class discussion is graded following a rubric that assesses student ability to apply terminology while comparing, contrasting, describing, explaining and illustrating concepts of weather and climate.

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

1. Search the internet for five cities (worldwide) that have opted to go “Green” - compare their charter for sustainable development focusing on goals for reducing greenhouse gases. Describe promotional offers, such as rebates, to encourage participation from businesses and industries. In a table, list an indicator of global warming that directly impacts each of these cities. Describe the scientific evidence and political-economic debate that prompted these cities to go green. Your participation on this in-class activity will be based on your ability to integrate terminology, concepts and processes behind weather and climate, and provide web links to city charters, maps, and more, as references (minimum five references).
2. Everyone will work as a group to complete a worksheet during the field trip, that is a summary of what they experienced and learned. The worksheet must demonstrate integration of terms and concepts from lectures and demonstrations. Individually, each student will attach to the worksheet a brief paper that relates the field experience to a phenomenon that they are interested in learning more about. The paper must be a minimum of 500 words (graphics are encouraged but must reference the image source), with at least five references to independent web sites (with active links imbedded in the paper) that support their exploration of the phenomenon. This paper will be submitted digitally so that references can be validated, Image references are not considered as part of the five references, unless integrated in the body of your report as text. The paper will be graded on a rubric that assesses your ability to think critically beyond what was presented in class and apply what you learned in the field. The grade will also be scaled by number of weather and climate terms and concepts correctly integrated in the text of the paper, i.e. 3 = C and 5 = A.

Textbooks:

- Lutgens, F (2019). *The Atmosphere: An Introduction to Meteorology* Pearson. ISBN: 9780134790466

Other Resources:

- Access code to MasteringGeography tests and exercises can be purchased separately as well as etext option.

Minimum Qualification

- Geography (Masters Required)