GAVILAN COLLEGE
5055 Santa Teresa Blvd
Gilroy, CA 95023

Course Outline

COURSE: PSCI 2 DIVISION: 10 ALSO LISTED AS:

TERM EFFECTIVE: Fall 2016 CURRICULUM APPROVAL DATE: 02/22/2016

SHORT TITLE: INTRO METEOROLOGY

LONG TITLE: Introduction to Meteorology

Units	Number of Weeks	Type	Contact Hours/Week	Total Contact Hours
3	18	Lecture:	3	54
		Lab:	0	0
		Other:	0	0
		Total:	3	54

COURSE DESCRIPTION:

An introductory course in Meteorology that is both descriptive and analytical on the physical principles affecting the earth's weather. Topics covered include the nature of the atmosphere, solar energy, heat, temperature, pressure, stability, moisture, wind, storms, severe weather and forecasting. The course introduces climatology as a scientific study and will look at the earth's climatic history, current research in climate modeling and the possibility of global climate change. ADVISORY: MATH 205.

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES
L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:
02 - Lecture and/or discussion
05 - Hybrid
72 - Dist. Ed Internet Delayed

STUDENT LEARNING OUTCOMES:
1. Read weather maps and correctly interpret the main weather map symbols.

Measure: Laboratory assignments
PLO:
ILO: 2, 1
GE-LO: B1
Year assessed or anticipated year of assessment: 2010

2. Describe the mechanisms by which heating imbalances drive the atmospheric circulation

Measure: Laboratory assignments; final exam
PLO:
ILO: 2,1
GE-LO: B1
Year assessed or anticipated year of assessment: 2010

3. Explain the relation between the wind field and pressure patterns.

Measure: Laboratory assignments; final exam
PLO:
ILO: 2, 1
GE-LO: B1
Year assessed or anticipated year of assessment: 2010

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 02/22/2016

3 Hours

CONTENT: Introduction to basic characteristics of weather, sources of weather information, various parameters that are used to describe the state of the atmosphere. This is the Preview Week, designed by the American Meteorological Society to let students become familiar with the course. The material is the same for Week 2.

STUDENT PERFORMANCE OBJECTIVES (SPO): Identify principal weather systems that are plotted on surface weather maps, describe properties of weather systems, define common parameters used to describe the state of the atmosphere, explain advantages of satellite observations, distinguish between visible and infrared satellite images, apply the 'hand-twist' model of wind direction to the circulation in actual highs and lows, draw isobars to show the pattern of surface air pressure across the nation at map time.

OUT-OF-CLASS ASSIGNMENTS: Draw isobars on a surface weather map and interpret isobar patterns, apply the hand-twist model to surface winds in highs and lows.

3 Hours

CONTENT: Introduction to basic characteristics of weather, sources of weather information, various parameters that are used to describe the state of the atmosphere. This material is the same as for Week 1 (see above).

SPO: Identify principal weather systems that are plotted on surface weather maps, describe properties of weather systems, define common parameters used to describe the state of the atmosphere, explain advantages of satellite observations, distinguish between visible and infrared satellite images, apply the 'hand-twist' model of wind direction to the circulation in actual highs and lows, draw isobars to show the pattern of surface air pressure across the nation at map time.

OUT-OF-CLASS ASSIGNMENTS: Draw isobars on a surface weather map and interpret isobar patterns, apply the hand-twist model to surface winds in highs and lows.

3 Hours

CONTENT: Introduction to atmosphere: origin, composition and structure. Distinguishing between weather and climate.

SPO: To distinguish between weather and climate, sketch vertical temperature profile of the atmosphere, distinguish between troposphere, stratosphere, and ionosphere.

OUT-OF-CLASS ASSIGNMENTS: Decode symbols on a surface weather map and interpret weather conditions, plot a sounding on a Stuve diagram and compare to the U.S. Standard Atmosphere.

3 Hours

CONTENT: Solar and terrestrial radiation. Study of the flow of electromagnetic radiation into and out of the Earth-atmosphere system.

SPO: To consider the variability of sunlight received at different latitudes over the period of a year, to identify principal characteristics of radiation and the electromagnetic spectrum, to describe the interactions that take place when solar radiation strikes the Earth's surface, to explain the role of the ocean in the global solar radiation budget.

OUT-OF-CLASS ASSIGNMENTS: Compare visible and infrared satellite images for weather interpretation, describe variations in solar radiation throughout the year by latitude.

4 Hours

CONTENT: Heat, temperature and atmospheric circulation. Introduction to the measure of temperature, how heat is transported via conduction, convection, and phase changes of water. Distinguishing between sensible heating and latent heating, and their importance on a global scale.

SPO: Students should be able to draw isotherms to show the pattern of air temperatures across the nation, locate regions on a weather map where cold and warm air advection are likely to be occurring, relate temperature advection patterns to circulations of weather systems, calculate the number of heating or cooling degree-days accumulated on a given day, demonstrate the use of current data to determine the number of heating or cooling degree-days in selected locations, describe the pattern of average annual heating-degree totals over the coterminous U.S., determine wind chill temperatures based on temperature and wind observations.

OUT-OF-CLASS ASSIGNMENTS: Draw isotherms on a surface map and determine areas of warm and cold air advection, calculate heating and cooling degree-days and determine wind chill.

3 Hours

CONTENT: Air pressure. Discussion of an aneroid barometer compared to a mercury barometer, discuss the significance of air pressure tendency for local weather forecasting. Show how the gas law applies to the atmosphere, how surface air pressure varies with different types of air masses, how divergence and convergence of horizontal winds can cause changes in air pressure.

SPO: Identify air pressure changes and other local weather conditions that indicate the passage of a cold front, relate local air pressure changes and weather conditions to the presence of different air masses before and after the passage of a cold front, estimate the speed of movement of a strong, well-defined cold front. Explain how variations in air temperature cause differences in air pressure, describe how density contrasts between warm and cold air produce horizontal variations in air pressure at different altitudes in the atmosphere.

OUT-OF-CLASS ASSIGNMENTS: Use a meteogram to describe changes in air pressure and other weather conditions with the passage of a cold front. Use the pressure block concept to demonstrate the influence of air density and air temperature on changes in air pressure with altitude.

3 Hours

CONTENT: Humidity, saturation and stability. First of three sections on moisture in the atmosphere, describing fundamental concepts of global water cycles, ways of expressing water vapor concentration, the nature of saturation through expansional cooling, stability of air, and lifting processes.

SPO: Describe how air temperature changes as air pressure changes, make clouds appear and disappear in a bottle, describe the role condensation nuclei play to enhance cloud formation, explain how most clouds form in the atmosphere.

OUT-OF-CLASS ASSIGNMENTS: Use cloud-in-a-bottle demonstration to illustrate how temperature changes are related to pressure changes.

3 Hours

CONTENT: Humidity, saturation and stability. Second section on moisture in the atmosphere, considering cloud formation and classification, fog, precipitation processes and forms, and weather radar.

SPO: Describe how to use a Stuve diagram to follow atmospheric temperature processes, determine the temperature of air that rises or sinks in the atmosphere, describe how the water vapor saturation of air can affect atmospheric temperatures.

OUT-OF-CLASS ASSIGNMENTS: Use a Stuve diagram to illustrate dry and saturated adiabatic processes as air parcels ascend and descend in the atmosphere.

4 Hours

CONTENT: Clouds, precipitation and weather radar. Third section on moisture in the atmosphere, considering cloud formation and classification, fog, precipitation processes and forms, and weather radar.

SPO: List the sources and types of cloud nuclei, explain the significance of hygroscopic nuclei, identify the various fog-forming processes, list conditions required for extreme nocturnal radiational cooling, explain the significance of terminal velocity in the formation of precipitation, describe the Bergeron-Findeisen process. Based on the weather radar depictions, students should be able to locate areas of precipitation and indicate the general relationship between the uplift of air and the formation of clouds and precipitation, describe aspects of the actual wind that are detected by Doppler radar, determine the speed of the wind toward or away from radar sites, and construct wind patterns as detected by Doppler radar.

OUT-OF-CLASS ASSIGNMENTS: Locate and track areas of precipitation using weather radar operating in the reflectivity mode, describe the wind pattern detected by Doppler weather radar for a severe weather situation.

3 Hours

CONTENT: Wind and weather. Discussion of atmospheric circulation and weather systems, forces (pressure gradient, centripital, Coriolis, friction and gravity) that initiate and shape the wind.

SPO: Describe horizontal forces that act on air parcels. Show the directions toward which these atmospheric forces act. Relate these horizontal forces to the winds reported on weather maps. Describe the topography of upper-air constant pressure surfaces based on height contours, including the identification of highs, lows, ridges, and troughs. Describe the general relationship between height contours and the temperature of the underlying atmosphere. Describe the relationship between the height contours and wind direction on upper-air maps.

OUT-OF-CLASS ASSIGNMENTS: Examine the influence of forces on horizontal air motion near the Earth's surface, describe the properties of a 500-mb map analysis and identify highs, lows, ridges and troughs.

3 Hours

CONTENT: Atmosphere's Planetary Circulation. This and the next three sessions are concerned with the genesis and characteristics of a variety of weather systems. We examine these systems in order of decreasing spatial scale, beginning with the largest scale, the global or planetary circulation. Semipermanent pressure systems, wind belts, and the Intertropical Convergence Zone (ITCZ) are principal features of the planetary-scale circulation.

SPO: List the principal components of the atmosphere's planetary-scale circulation, describe the linkage between the subtropical anticyclones and the trade winds, describe the linkage between the subtropical anticyclones and the westerlies.

OUT-OF-CLASS ASSIGNMENTS: Examine upper-air westerly wave patterns, the jet stream, and how these features influence midlatitude surface weather.

3 Hours

CONTENT: The second of four sessions concerned with the genesis and characteristics of a variety of weather systems. The Intertropical Convergence Zone (ITCZ) and El Nino will be examined as principal features of the atmospheric circulation.

SPO: Describe the long-term average conditions of the tropical Pacific Ocean and atmosphere. Compare El Nino conditions to long-term average conditions. Explain how atmospheric conditions during El Nino are transmitted beyond the tropical Pacific area.

OUT-OF-CLASS ASSIGNMENTS: Describe atmospheric and oceanic conditions that accompany periodic warmings of the tropical Pacific Ocean (El Nino).

4 Hours

CONTENT: Weather systems of middle latitudes. This session covers synoptic-scale weather systems plus selected regional and local circulation systems that affect the weather of middle latitudes. Air masses, fronts, cyclones, and anticyclones are plotted on surface weather maps.

SPO: Identify the various air masses that regularly form over or invade North America, explain why fronts are associated with extratropical cyclones but not with anticyclones, sketch the stages in the life cycle of an extratropical cyclone. Describe the pattern of surface winds and weather about the center of a midlatitude cyclone. Specify the type of weather associated with fronts that rotate about a midlatitude cyclone's low-pressure center. Describe the sequence of changes in weather that typically takes place on the right side and left side of a cyclone track.

OUT-OF-CLASS ASSIGNMENTS: Describe weather conditions surrounding the center of a typical midlatitude cyclone. Compare weather conditions on either side of a mature midlatitude cyclone.

3 Hours

CONTENT: Thunderstorms and tornadoes. This session covers the genesis, properties, and hazards of thunderstorms and tornadoes. We describe the three stages in the life cycle of a thunderstorm cell (cumulus, mature, and dissipating) and distinguish among single-cell and multi-cellular thunderstorms.

SPO: List the characteristics of a severe thunderstorm, sketch the synoptic weather pattern that favors severe thunderstorms, describe the atmospheric conditions that precede a lighting discharge. Describe the appearance of thunderstorms on visible satellite imagery. Identify probable locations of thunderstorms on infrared satellite imagery. List some of the characteristics of the path of an intense tornado. Describe the general weather conditions favorable for formation of tornadic thunderstorms. Explain why winds on one side of a tornado may be stronger than winds on the other side.

OUT-OF-CLASS ASSIGNMENTS: Examine thunderstorms as they appear on visible and infrared satellite images, determine some of the characteristics of the Oklahoma City tornado.

4 Hours

CONTENT: Tropical weather systems. In this session we examine tropical weather systems with primary focus on hurricanes and tropical storms. We describe the characteristics of hurricanes, their geographical and seasonal distribution, hazards associated with hurricanes, and the life cycle of tropical cyclones.

SPO: Describe the basis of the Saffir-Simpson Hurricane Intensity Scale, present the life cycle of a tropical cyclone, explain why the southeastern United States is particularly vulnerable to a destructive hurricane. Describe the track taken by a hurricane that occurred in the Gulf of Mexico. Indicate the probable position of highest storm surge when a hurricane makes landfall. Describe the relationship between the maximum wind speeds and the central pressure in a hurricane. Categorize the damage potential of a hurricane based on wind speeds. Explain how wind speeds in hurricanes are affected by landfall.

OUT-OF-CLASS ASSIGNMENTS: Plot a hurricane as it approaches a coastal area and assess the potential threats to life and property. Explore the relationships between central sea-level pressures and wind speeds throughout the life of a hurricane.

2 Hours Final

METHODS OF INSTRUCTION:

Online lectures, student investigations, exams, and online weather projects.

METHODS OF EVALUATION:

This is a degree-applicable course, but substantial writing assignments

are NOT appropriate, because the course primarily:

Involves skill demonstrations or problem solving
The problem-solving assignments required:
Homework problems
Exams
Other: Online investigations.
The types of skill demonstrations required:
None
The types of objective examinations used in the course:
None
Other category:
None
The basis for assigning students grades in the course:
Writing assignments: 0% - 0%
Problem-solving demonstrations: 100% - 100%
Skill demonstrations: 0% - 0%
Objective examinations: 0% - 0%
Other methods of evaluation: 0% - 0%

REPRESENTATIVE TEXTBOOKS:

Required:

Mills, Elizabeth W. (ed.). Weather Studies, 6th Edition. Boston, MA: American Meteorological Society, 2015. Or other appropriate college level text.

ISBN: 1-940073-41-1

Reading level of text, Grade: 14Verified by: Dana Young

Other textbooks or materials to be purchased by the student: Weather Studies eInvesigations Manual, 2015-2016 and Summer 2016.

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:
GAV B1, effective 200550
CSU GE:
CSU B1, effective 200550
IGETC:
IGETC 5A, effective 200550
CSU TRANSFER:
Transferable CSU, effective 200550
UC TRANSFER:
Transferable UC, effective 200550

SUPPLEMENTAL DATA:

Basic Skills: N
Classification: Y
Noncredit Category: Y
Cooperative Education:
Program Status: 1 Program Applicable
Special Class Status: N
CAN:

CAN Sequence:
CSU Crosswalk Course Department: PSCI
CSU Crosswalk Course Number: 2
Prior to College Level: Y
Non Credit Enhanced Funding: N
Funding Agency Code: Y
In-Service: N
Occupational Course: E
Maximum Hours:
Minimum Hours:
Course Control Number: CCC000016202
Sports/Physical Education Course: N
Taxonomy of Program: 190100