

## Colorado CTE Course – Scope and Sequence

<b>Course Name</b>	<b>Aviation Weather</b>		<b>Course Details</b>	<b>Credit = 0.5</b> <b>Prerequisites: None</b> <b>CTE Credential= CTE Transportation Operations, CTE STEM, CTE Transportation</b>	
			<b>Course = 0.50 Carnegie Unit Credit</b>		
<b>Course Description</b>	This course develops basic meteorological concepts that apply to aviation. Emphasis is on the use of national weather service reports and forecasts to evaluate flight conditions. The course also prepares students for the weather section of the FAA Private Pilot Knowledge examination.				
<b>Note:</b>	This is a suggested scope and sequence for the course content. The content will work with any textbook or instructional resource. If locally adapted, make sure all essential knowledge and skills are covered.				
SCED Identification #	20053	Schedule calculation based on 60 calendar days of a 90-day semester. Scope and sequence allows for additional time for guest speakers, student presentations, field trips, remediation, or other content topics.			
All courses taught in an approved CTE program must include Essential Skills embedded into the course content. The Essential Skills Framework for this course can be found at <a href="https://www.cde.state.co.us/standardsandinstruction/essentialskills">https://www.cde.state.co.us/standardsandinstruction/essentialskills</a>					
Instructional Unit Topic	Suggested Length of Instruction	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
<b>Earth's Atmosphere</b>		Understand the interaction of the Sun, the Earth's water, land and atmosphere to produce weather phenomena. Identify the components of the earth's atmosphere.	Explain the composition of earth's atmosphere. Student is expected to: (A) identify the three main elements in the composition of the atmosphere; (B) understand the difference between climate and weather; (B) understand how the earth's atmosphere is related to aviation.	Identify and explain elements that manipulate the earth's atmosphere. Describe and explain the origin, composition, structure and behavior of the earth's atmosphere. Describe temperature, pressure, density, moisture, wind and circulation as it relates to the earth's atmosphere.	
<b>Heat and Temperature</b>		Understand the impacts of heat and temperature on flight navigation.	Student is expected to: (A) describe how unequal heating and	Discuss why and how the air acts differently in a warm or cold environment.	

			<p>rotation of the Earth cause patterns of atmospheric and oceanic circulation that determine regional climates;</p> <p>(B) Define radiation and explain the energy transfer by radiation, conduction and convection; and</p> <p>(C) explain how temperature variation influences flight performance.</p>	<p>Create a graphic that defines radiation and explain the energy transfer by radiation, conduction and convection.</p>	
<b>Water Vapor</b>		<p>Understand the relationship of water vapor to weather.</p>	<p>Apply knowledge of water vapor and weather to aviation navigation considerations. Student is expected to:</p> <p>(A) identify precipitation types, dew, and frost;</p> <p>(B) define 'dew point'</p> <p>(C) calculate dew point</p> <p>(D) describe the characteristics of dew point</p> <p>(E) explain the relationship between dew point and weather</p>	<p>Perform dew point calculations given various scenarios.</p>	
<b>Atmospheric Pressure and Altimetry</b>		<p>Understand the relationship of atmospheric pressure and altimetry for flight navigation.</p>	<p>Student is expected to:</p> <p>(A) analyze pressure systems at different attitudes on a surface map;</p>	<p>Given a weather scenario, students calculate an optimal flying elevation based upon velocity and weather limitations.</p>	

			(B) solve problems involving velocity and other quantities that can be represented by vectors.		
<b>Weather</b>		Explain basic weather theory. Identify sources of weather information used in aviation.	Apply weather theory and weather sources. Student is expected to: (A) apply basic weather theory; (B) understand the weather patterns and weather sources and how they behave and act; (C) Understand weather data interpretation and find the weather data source for use in aviation; (D) understand Significant Meteorological Information Service (SIGMET); and (E) define the role of the Aviation Data Service (ADDS).	Explain the weather services available to pilots. (Who provides reports, what information is included, how to access, frequency of updates, etc.) <ul style="list-style-type: none"> <li>• Explain the three kinds of aviation weather reports</li> <li>• Name types of weather observations and briefings.</li> </ul> Explain the differences between surface, upper air and radar weather observations. Explain the three types of weather briefings (Standard, Abbreviated, Outlook). Explain the use of aviation weather reports: <ul style="list-style-type: none"> <li>• METAR</li> <li>• PIREP</li> <li>• SD</li> </ul> Define service outlets and compare and contrast FSS, EFAS and HIWAS.	

<p><b>Wind, Global Calculations and Jet Stream</b></p>		<p>Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions.</p>	<p>Student is expected to: (A) describe the three main types of global wind patterns (B) explain how the Coriolis Effect determines these patterns; (C) define the Coriolis Effect; and (D) identify sea breeze, land breeze, valley breeze, mountain breeze; (E) demonstrate understanding of the nature of, formation, influence and movement of the jet stream.</p>	<p>Explain the relationship between wind and low and high pressure. Explain how the Coriolis Effect determines global wind patterns. Determine the weight and the balance of a flying object. Design a wind and project plan. Calculate the effect of environment of the flight. Predict an unmanned flight performance. Illustrate how these forces both produce and are products of broader patterns of circulation in the atmosphere</p>	
<p><b>Local Wind</b></p>		<p>Understand local wind and its impact on flight. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).</p>	<p>Understand the impact of local wind for flight navigation purposes. Student is expected to: (A) define local wind; (B) understand how local wind impact flight navigation; and (B) collect and analyze local weather data.</p>	<p>Interpret current weather conditions using a weather map. Students journal weather data, plot the data, and analyze the data looking for patterns. Examine the mechanics of smaller scale phenomena, (squall lie storms, local winds, and convection. Report on how these impact aviation navigation.</p>	
<p><b>Air Masses, Fronts, and Wave Cyclone Model</b></p>		<p>Understand characteristics of common weather phenomena, their formation, and their impact on aviation.</p>	<p>Describe the characteristics of weather fronts and air masses and their impact</p>	<p>Interpret frontal weather data. Explain how weather fronts are forecast. Include</p>	

			<p>on aviation. Student is expected to:</p> <p>(A) define weather front;</p> <p>(B) describe how weather fronts affect weather</p> <p>(C) explain frontal weather and associated thunderstorm development; and</p> <p>(D) Identify four major air mass categories.</p>	<p>information about major weather services.</p> <p>Interpret weather reports and METARs</p> <p>Demonstrate or explain how to conduct basic aviation weather forecasting.</p> <p>Explain the following weather phenomena and their impacts on aviation operations: wind shear, mountain waves, volcanic eruptions, hurricanes, jet stream shifts, el nino and la nina.</p>	
<b>Vertical Motion and Cloud Formation</b>		Describe weather patterns and clouds.	Compare and contrast the types of clouds; Explain convectonal lifting and its impact in cloud formation.	Identify the types of clouds (stratus, cumulonimbus, and cirrus) at different elevations and the potential hazards that may exist.	
<b>Atmospheric Stability</b>		Understand weather hazards for flight navigation. Describe weather phenomena which impacts aviation and flight operations, including atmospheric composition and atmospheric circulation systems.	Understand weather hazards and their impact on flight. Student is expected to: (A) identify common weather hazards; (B) state common procedures/processes for pilots during hazard conditions; (C) Explain the effects of icing on an airplane; (D) interpret current weather conditions using a weather map.	Interpret current weather conditions using a weather map. Describe the formation cold and warm fronts and their influence on forming cyclones, tornadoes, hurricanes, and typhoons. Compare and contrast the common weather hazards when flying Identify safe and corrective actions for common weather hazards as suggested by the Federal Aeronautics Administration (FAA).	

				Analyze the hazards associated with severe weather. Report on a weather-related aircraft incident and how the incident may have been mitigated.	
<b>Weather, Visibility and Flight</b>		Understand weather visibility decisions that affect aviation.	Apply knowledge of weather and visibility to flight operations. Student is expected to: (A) define ceiling and visibility; (B) explain how visual observations are made for assessment of flight conditions (C) explain basic Visual Flight Rules (VFR) weather minimums	Demonstrate how to gather, analyze, and use weather data during preparation for flight operations, including the impact of such information on decisions to fly or not fly. Explain how visual observations are made ( e.g. Beaufort Scale), including sky conditions, cloud forms, other atmospheric phenomena (e.g. halos, sun dogs, smoke, etc.) Analyze the following texts, synthesize the information found, and demonstrate the ability to retrieve the correct information in a timely fashion to aid in aviation decision making: Aviation Routine Weather Report (METAR)s, Pilot Weather Reports (PIREP)s, Aviation Area Forecast, Terminal Aerodrome Forecast (TAF)s, Weather Depiction Charts, Radar Summary Charts and Radar Weather Reports, En route Flight Advisory Service (EFAS), Wind and Temperature Aloft Forecasts (FB), Significant Weather Prognostic Charts,	

