

Colorado CTE Course – Scope and Sequence

Course Name	Introduction to Aircraft Technology		Course Details	Credit = 1.0 No pre-requisites Teacher Credential Endorsement Area: CTE Transportation Operations (Aviation holding FAA pilot license); CTE Transportation (holding FAA A & P)	
			Course = 1.0 Carnegie Unit Credit		
Course Description	Introduction to Aircraft Technology is designed to teach the theory of operation of aircraft airframes, power plants, and associated maintenance and repair practices. Maintenance and repair practices include knowledge of the function, diagnosis, and service of general curriculum subjects, airframe structures, airframe systems and components, power plant theory and maintenance, and power plant systems and components of aircraft. Industry recognized professional licensures, certifications, and registrations are available for students who meet the requirements set forth by the accrediting organization.				
Note:	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 https://www.cde.state.co.us/standardsandinstruction/essentialskills					
Instructional Unit Topic	Suggested Length of Instruction	CTE or Academic Standard Alignment	Competency / Performance Indicator	Outcome / Measurement	CTSO Integration
Careers in Aviation Maintenance		Integrate multiple sources of career information from diverse formats to make informed career decisions, solve problems, and manage personal career plans. Explore how information and communication technologies are used in career planning and decision making. Research the scope of career opportunities available and the requirements for	Investigate the various career pathways in the aviation industry. The student is expected to: (A) investigate an area of interest in aviation; (B) describe the functions of engineers, pilots, aircraft control, and mechanical technicians in the industry; and	Research aviation career opportunities of interest by participating in career exploration activities. Evaluate jobs data and employment projections in the construction industry from sources such as O*Net OnLine, synthesizing findings from each source. Explore the requirements, skills,	SkillsUSA Personal Skills SkillsUSA 4 Pillars Updates to Student ICAP

		education, training, certification, and licensure. Integrate changing employment trends, societal needs, and economic conditions into career planning.	(C) select and report on career opportunities, requirements, and expectations in the aviation technology industry.	wages, education, and geographic opportunities in one career associated with careers in aviation. • Identify employability skills preferred by different aviation occupations. • Compare and contrast career opportunities related to different fields of aviation. • List the requirements for industry certification for pilots and mechanics. Define employment expectations of entry-level employees in local employment situations (hiring requirements, basic job expectations, etc.) Explain roles and relationships of entities within the industry (i.e. relationships of unions, airports, flight operators, FAA, NTSB, air traffic control, OSHA, etc.) Demonstrate skills necessary to obtain employment: • Create an industry appropriate resume	
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				Navigate online job posting tools and complete an employment application Research basic regulations affecting today's aviation industry.	
Applied Mathematics and Physics for Aviation		Understand and apply mathematical principles appropriate to the aviation industry. Understand scientific principles as they relate to aircraft aerodynamics.	Apply mathematical constructs to solve aviation- related calculations. Student demonstrates the ability to: (A) add, subtract, multiply and divide whole numbers, decimals and fractions; and (B) calculate roots, percentages, ratios, basic algebraic functions, area, volume, and trigonometric functions. Use scientific principles appropriate to the aviation industry. Student is expected to: (A) understand the scientific principles of physics that impact flight operations and aircraft design (weight versus drag, Newton's Laws of Motion, Bernoulli Effect and Venturi Effect);	Citing appropriate textual evidence, identify the basic safety issues relating to the aircraft, including but not limited to: aircraft airworthiness, taxiing in wind, operating within the aircraft's approved weight and balance, and airspeed limitations. Explain the specific functions of various aircraft structures. For example, be able to understand and communicate the purpose for the aircraft's wings, tail, cabin, and other structures. Incorporate relevant design and mathematics concepts as appropriate when explaining how specific aircraft structures function. For example, relate how the design of an aircraft's wings leverage the principles of aerodynamics.	

			(B) describe the main components and aerodynamic principles of fixed wing aircraft and rotorcraft; (C) investigate the basic parts and control surfaces on the aircraft; (D) calculate work, force, power, and mechanical advantage; (E) calculate gas law equations, temperature and pressure conversions.		
Safety		Demonstrate health and safety procedures, regulations, and personal health practices and determine the meaning of symbols, key terms, and domain-specific words and phrases as related to the Transportation sector workplace environment. Understand and apply practices and procedures required to maintain jobsite safety.	The student understands that safe working standards are imperative in the classroom and in the field. The student is expected to: (A) interpret policies, procedures, and regulations for the workplace environment, including employer and employee responsibilities; (B) use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies; (C) practice personal safety and maintain a	Obtain OSHA 10 certificate and be able to state basic safety requirements for the industry. Identify basic jobsite safety hazards. Demonstrate use of basic Personal Protective Equipment (PPE) and when specific PPE is required. Understand basic workplace injuries and how to communicate the injury to others in an emergency. Demonstrate safe handling of materials and equipment. Demonstrate safe use of fire extinguishers.	

			safe and healthful working environment; (D) apply relevant safety information based on OSHA and FAA guidelines and principles; and (E) identify federal laws and rules applicable to the workplace and enforcement agencies such as the Equal Employment Opportunity Commission and the Occupational Safety and Health Administration (OSHA).	Demonstrate ability to communicate workplace hazards.	
Aircraft Instrument and Warning Systems		Understand the general application and classification of flight navigation instrumentation and warning systems commonly found on aircraft.	Understand the general application and classification of flight navigation instrumentation and warning systems commonly found on aircraft. The student is expected to: (A) classify different types of instruments; (B) construct an overview of pressure measurement instruments; (C) give examples of both pressure and temperature measuring instruments;	Explain the typical application and operation of the basic communication and navigation radios and instrumentation, including but not limited to: a. Comm # 1 b. Comm # 2 c. Nav # 1 d. Nav # 2 Explain the typical application and operation of the basic flight instruments, including but not limited to: a. Airspeed Indicator b. Attitude Indicator c. Altimeter d. Turn Coordinator e. Directional Indicator f. Vertical Speed Indicator	

			(D) list the different types of mechanical movement measuring instruments; (E) perform a compass swing; (F) perform a pitot-static system check; and (G) illustrate proper instrument installation and range markings.		
Overview of Aircraft Mechanical Systems		Understand the major systems involved in the flight of an aircraft	Understand the major systems involved in the flight of an aircraft. Student is expected to: (A) Identify Aircraft Engine Types (B) List types of Aircraft Propeller Systems (C) State the major functions of Aircraft Systems (D) Examine the components of Electrical, Hydraulic and Pneumatic Systems of an aircraft (E) Understand common procedures relating to safety, maintenance, and troubleshooting of issues related to aircraft technology	Draw on aviation handbooks and other course materials to outline the specific functions of each aircraft's flight control. Describe the purpose of the aircraft's ailerons, elevators, rudder, and flaps, and explain the effect that each of these controls has on the aircraft's controllability. Draw on aviation handbooks and other course materials to describe in a verbal or written format how a typical reciprocating engine is used on a general aviation aircraft. Compare and contrast the advantages and disadvantages of a reciprocating engine versus a turbine engine on a training aircraft. In a graphic illustration such as an annotated diagram or electronic presentation, explain the typical application	

				and operation of the basic electrical system, including but not limited to: a. Battery b. Alternator / Generator c. Circuit Breakers d. Master Switch(es)	
Aircraft Schematics and Basic Equipment		Understand basic aircraft schematics and how they are applied in the aviation industry.	Understand how aircraft schematics are used in the industry. The student is expected to: (A) identify and interpret the meaning of lines, symbols, dimensions and tolerances as they relate to aircraft drawings.	Make a drawing or sketch illustrating a major repair or alteration, including correct position of views, dimensions, and specific materials.	
Flight Mechanics and Maintenance		Understand the mechanical role in flight safety and design.	Understand and apply technical knowledge of the mechanical systems of an aircraft. Student is expected to: (A) identify ground operation, servicing, and maintenance forms; (B) list equipment that makes up the landing gear, hydraulic, and pneumatic systems of the aircraft; (C) list the steps of the airframe inspection; (D) identify fuel and fluid line equipment and	Create a preflight checklist that a mechanic would use. Demonstrate proper fueling, tie-down, and pre-flight procedures. Identify applicable compliance requirements for maintenance records. Describe the operational principles of aircraft power generation and distributions systems. Document items of preventative maintenance on aircraft landing gear systems. Explain how fuel systems operate on a typical aircraft, and cite specific dangers and	

			concerns from the mechanical perspective; (E) identify basic electrical system of an aircraft; and (F) identify the basic ignition system of an aircraft. Identify and Utilize Hand Tools: Identify and Utilize Power Tools and Equipment:	associated precautions that aircraft personnel should take when inspecting, filling, and draining fuel systems. Given a scenario or diagram assigned by the instructor, demonstrate the ability to identify and describe the characteristics of the fuel system, including but not limited to: a. Fuel tanks b. Fuel selector valves c. Fuel filters and drains Explain the typical application and operation of the basic ignition system, including but not limited to: a. Magnetos b. Spark plug wires c. Spark plugs	
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Academic Standards Alignment

Colorado CTE courses are required to integrate academic and essential skills into course content. The following academic standards have been identified as aligned to this course and should be integrated throughout instruction.

[CO CTE Academic Standards Resources](#) (Rubrics, integration strategies, etc) [CDE Colorado Academic Standards Online](#) (Online standards lookup tool)

Reading, Writing, & Communicating

Standard 1: Oral Expression and Listening

- **Prepared Graduate 1:** Collaborate effectively as group members or leaders who listen actively and respectfully; pose thoughtful questions, acknowledge the ideas of others; and contribute ideas to further the group's attainment of an objective.
- **Prepared Graduate 2:** Deliver effective oral presentations for varied audiences and varied purposes.

Standard 2: Reading for All Purposes

- **Prepared Graduate 3:** Read a wide range of literary texts to build knowledge and to better understand the human experience.
- **Prepared Graduate 4:** Read a wide range of informational texts to build knowledge and to better understand the human experience.

- **Prepared Graduate 5:** Understand how language functions in different contexts, command a variety of word-learning strategies to assist comprehension, and make effective choices for meaning or style when writing and speaking.

Standard 3: Writing and Composition

- **Prepared Graduate 6:** Craft arguments using techniques specific to the genre.
- **Prepared Graduate 7:** Craft informational/explanatory texts using techniques specific to the genre.
- **Prepared Graduate 8:** Craft narratives using techniques specific to the genre.
- **Prepared Graduate 9:** Demonstrate mastery of their own writing process with clear, coherent, and error-free polished products.

Standard 4: Research Inquiry and Design

- **Prepared Graduate 10:** Gather information from a variety of sources; analyze and evaluate its quality and relevance; and use it ethically to answer complex questions.

Note: Mathematics and Science standards will be added in the future. Visit the [Colorado Academic Standards](#) page for the most current version.