

Colorado CTE Course – Scope and Sequence

Course Name	Aircraft Power Plant Technology		Course Details		Credit=1.0 Prerequisite: Introduction to Aircraft Technology CTE Credential: CTE Transportation	
			Course = 0.50 Carnegie Unit Credit			
Course Description	Aircraft Power plant Technology is designed to teach the theory of operation of aircraft power plants and associated maintenance and repair practices. Power plant maintenance and repair practices include knowledge of the theory, function, diagnosis, and service of 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 #	20113	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	
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 demonstrate lab safety rules and procedures. Student is expected to: (A) Demonstrate general shop safety rules and procedures; (B) Demonstrate knowledge of OSHA and its role in workplace safety; (C) Comply with the required use of personal protective equipment (PPE) during lab/shop activities; (D) Utilize safe procedures for handling of tools and equipment; (E) Operate lab equipment according to safety guidelines;			

		Understand and apply practices and procedures required to maintain jobsite safety. Understand industry standards and protocols for safe working environments. Identify federal safety and environmental rules and regulations.	(F) Identify and use proper lifting procedures and proper use of support equipment; (G) Utilize proper ventilation procedures for working within the lab/shop area; (H) demonstrate knowledge of the technology and skills related to human factors in health and safety in the workplace, as specified by appropriate governmental regulations and an understanding of personal responsibility in this area; (I) demonstrate awareness of the technical knowledge, skills, and attitudes related to human factors in a safe and productive workplace, and the role of the employee in creating that success, including personal responsibility; (J) demonstrate knowledge and a high degree of skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft; and (K) demonstrate knowledge of the proper handling and disposal of environmentally hazardous materials used in maintaining and servicing aircraft.		
Career Development		Integrate multiple sources of career information from diverse formats to make informed	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	Investigate aviation careers, training, and associated opportunities. Describe the difference between	Updates to ICAP SkillsUSA Personal and

		career decisions, solve problems, and manage personal career plans. Identify employment opportunities, including entrepreneurship opportunities, and certification requirements for the field of aircraft maintenance and repair.	(A) identify employment opportunities, including entrepreneurship opportunities, and certification requirements for the field of aircraft maintenance and repair; (B) evaluate employers' expectations and appropriate work habits; (C) discuss the competencies related to resources, information systems, and technology; and (D) apply reasoning to a variety of workplace situations in order to make ethical decisions. The student demonstrates appropriate interpersonal and communication skills. The student is expected to: (A) demonstrate the principles of group participation and leadership related to citizenship and career preparation; (B) describe and apply ethical and legal responsibilities appropriate to the workplace; (C) demonstrate the uses of proper etiquette and behavior; (D) identify benefits of personal appearance and health habits; (E) practice written and oral communication skills; and (F) employ effective listening skills.	aviation disciplines and job functions. Explore career opportunities and list the educational requirements for airframe technicians. Analyze Federal Aviation Regulations (FAR) as related to airframe and powerplant, pilot, schools, flight training centers, aircraft, and aircraft owners. Research the airframe and powerplant technician certificate requirements. Explain how the employment certification requirements relate to FAA requirements.	Employability Framework Skills
Aircraft Power Plant/ Engines		Explore scientific and technical principles of aircraft power plant systems and engines.	Understand fundamentals of aircraft power plant engine systems. Student is expected to: (A) compare and contrast aircraft engines;		

			(B) describe engine fuel and fuel metering systems; (C) list induction and exhaust systems components; (D) explore engine ignition and electrical systems; (E) inspect, remove, and install engine starting systems; (F) interpret lubrication and cooling systems; (G) research propellers; (H) perform engine removal and replacement; (I) summarize engine fire protection systems; (J) discuss engine maintenance and operation; and (K) research light-sport aircraft engines.		
Applied Academics: Aircraft Maintenance and Repair		Apply communication and literacy competencies to complete tasks in the aviation repair and maintenance industry. Use tools for measuring and perform calculations need to problem-solve aircraft repair and maintenance concerns.	The student relates academic skills to the requirements of aircraft maintenance and repair. The student is expected to: (A) demonstrate effective oral and written communication skills with individuals from various cultures, including fellow workers, management, and customers; (B) follow work orders and related paperwork; (C) develop an understanding of how to estimate parts and labor costs on power plant repair orders; (D) locate, read, understand the function of, and interpret documents, including schematics, charts, graphs, drawings, blueprints, wiring diagrams,		

		Apply mathematical and physics constructs to aviation repair and maintenance applications.	service-repair manuals and service bulletins, type certificate data sheets, supplemental type certificates, airworthiness directives, and federal aviation regulations and advisory information; (E) demonstrate an understanding of metric and U.S. customary standard measurement systems; (F) perform precision measurements, including the use of engineering scales, dial calipers, and Vernier micrometers; (G) employ critical-thinking skills and structured problem-solving skills to diagnose power plant system malfunctions, solve problems, and make decisions; and (H) research and understand the impact of new and emerging aircraft technologies.		
Aviation Service and Repair Fundamentals		Apply fundamental knowledge of general aviation maintenance practices. Understand the function and application of the tools, equipment, technologies, and preventative maintenance used in aviation	The student knows the technical knowledge and skills of aircraft maintenance and repair. The student is expected to: (A) apply and understand the principles of simple machines, fluid dynamics, and heat dynamics, including Boyle's Law and Charles' Law; (B) demonstrate knowledge of aircraft common terminology and standard practices and the tools required to complete maintenance, modifications, and repairs; and		

		maintenance and repair.	(C) discuss the completion of logbooks and computer applications to maintain required aircraft documents.		
Power plant Equipment and Technologies		Investigate power plant repair and maintenance procedures.	The student applies the technical knowledge and skills of aircraft maintenance and repair to power plant equipment and technologies. The student is expected to: (A) demonstrate knowledge of aviation regulations prescribed by the Code of Federal Regulations, Title 14, Volumes I-III, that govern mechanic privileges, the construction, maintenance, and service of aircraft, and 100-hour and annual inspections; (B) demonstrate understanding of aircraft reciprocating engines, including the operating theory, cylinder configurations, functions, and service and repair methods and techniques for two-cycle, four-cycle, and diesel engines; (C) demonstrate understanding of aircraft turbine engines, including the operating theory, mechanical arrangements, functions, and service and repair methods and techniques for turbojet, turbofan, turboprop, and turboshaft engines; (D) demonstrate knowledge of power plant systems and components, their functions, and basic operating principles, including		

			engine instruments, fire protection systems, electrical systems, lubrication systems, ignition and starting systems, fuel metering systems, fuel delivery systems, inductions systems, cooling systems, exhaust systems, and propellers; (E) review the necessary steps to perform a reciprocating engine overhaul following industry best practices; (F) identify and select appropriate nondestructive testing methods for component inspections, including dye penetrant, eddy current, ultrasonic, and magnetic particle inspections; (G) demonstrate knowledge of aircraft common terminology and standard practices and the tools required to complete maintenance, modifications, and repairs; and (H) demonstrate knowledge and a high degree of skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft.		
Preventative Maintenance		Understand the theory of operation of aircraft power plant systems and associated maintenance and repair practices.	The student knows the function and application of the tools, equipment, technologies, and preventative maintenance used in airframe maintenance and repair. The student is expected to:		

		(Aircraft power plant maintenance and repair practices include knowledge of the function, diagnosis, and service of structures, systems, and related components of aircraft's power plant.)	(A) demonstrate knowledge and a high degree of skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft; and (B) identify and understand the need for preventative maintenance procedures and practices. The student applies the technical knowledge and skills of the trade to simulated and actual work situations. The student is expected to: (A) determine power plant component wear accurately by using precision measuring and published specifications to determine if a given component is within wear tolerance and research necessary repairs; (B) research proper repair methods for a simulated repair and write a work order that calls out specific maintenance references and estimates cost of repairs; (C) create an appropriate inspection checklist for a given power plant based on regulated mandatory inspection points for an annual inspection and perform the inspection; (D) describe the detailed function and operation of a reciprocating and a turbine aircraft power plant using drawings and written descriptions;		
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			(E) describe the detailed function and operation of a reciprocating or turbine aircraft power plant system or component using drawings and written descriptions; (F) indicate and select proper products used in preventative maintenance for a given power plant from appropriate maintenance publications; and (G) perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations.		
Aircraft Power Plant Service		Demonstrate knowledge of federal regulations and industry practice standards for aircraft power plant maintenance and repair.	The student knows the technical knowledge and skills of aircraft maintenance and repair. The student is expected to: (A) demonstrate knowledge of aviation regulations prescribed by the Code of Federal Regulations, Title 14, Volumes I-III, that govern mechanic privileges, the construction, maintenance, and service of aircraft, and 100-hour and annual inspections; and (B) demonstrate knowledge of aircraft common terminology and standard practices and the tools required to complete maintenance, modifications, and repairs. The student applies the technical knowledge and skills of the trade to		

			simulated and actual work situations. The student is expected to: (A) construct a detailed engine troubleshooting chart showing possible defects and resulting effects on engine performance of a reciprocating or turbine aircraft power plant; (B) apply aircraft maintenance and repair essential knowledge and skills to learning experiences such as job shadowing, mentoring, apprenticeship training, and career preparation; and (C) perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations.		
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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.