Career and Technical Education TEKS Review Draft Recommendations

Texas Essential Knowledge and Skills (TEKS) for Career and Technical Education Draft Recommendations

Aviation Maintenance Work Group

Courses: Introduction to Aircraft Technology, Aircraft Maintenance Technology, Aircraft Airframe Technology, and Aircraft Powerplant Technology

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The document reflects the draft recommendations to the career and technical education (CTE) Texas Essential Knowledge and Skills (TEKS) that have been recommended by the State Board of Education's TEKS review work groups for: **Introduction to Aircraft Technology, Aircraft Maintenance Technology, Aircraft Airframe Technology, and Aircraft Powerplant Technology.**

Proposed additions are shown in green font with underline (additions). Proposed deletions are shown in red font with strikethroughs (~~deletions~~). Text proposed to be moved from its current student expectation is shown in purple italicized font with strikethrough (~~*moved text*~~) and is shown in the proposed new location in purple italicized font with underlines (*new text location*). Numbering for the knowledge and skills statements in the document will be finalized when the proposal is prepared to file with the *Texas Register*.

Comments in the right-hand column provide explanations for the proposed changes. The following notations may be used as part of the explanations.

Abbreviation	Description
CCRS	refers to the College and Career Readiness Standards
CDS	refers to cross disciplinary standards in the CCRS
ELA	refers to English language arts standards in the CCRS
SCI	refers to science standards in the CCRS
SS	refers to social studies standards in the CCRS
Gap Analysis	refers to gap analysis report on essential knowledge and skills aligned to in-demand high-wage occupations
KS	refers to knowledge and skills statement
SE	refers to student expectation

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§127.XXX ~~130.452~~. Introduction to Aircraft Technology (One Credit), Adopted 2024~~2015~~.		
	TEKS with edits	Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 9-12. Students shall be awarded one credit for successful completion of this course.	No Change
(b)	Introduction.	No Change
(1)	Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.	Can't Change
(2)	The Transportation, Distribution, and Logistics Career Cluster focuses on planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance.	Can't Change
(3)	Introduction to Aircraft Technology is designed to teach the theory of operation of aircraft airframes, powerplants, 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, powerplant theory and maintenance, and powerplant 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.	
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	Can't Change
(5)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	Can't Change
(c)	Knowledge and skills.	No Change
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	No Change
(A)	identify and compare employment opportunities, including entrepreneurship opportunities, and certification requirements for the field of aircraft maintenance and repair;	Added higher order task
(B)	exhibit the ability to cooperate, contribute, and collaborate as a member of a team;~~demonstrate the principles of group participation leadership related to citizenship and career preparation;~~	Relates to CCRS for ELA #3

(C)	identify individual ethical and legal behavior standards according to professional and regulatory agencies ~~demonstrate employers' expectations and appropriate work habits~~;	Added specific issues to working in aviation
(D)	research Federal Aviation Regulations and discuss the impact of the English language proficiency requirements as proscribed by the Federal Aviation Regulations; ~~discuss the competencies related to resources, information, systems, and technology;~~	We want to ensure students understand this federal regulation.
(E)	identify and explain ~~demonstrate awareness of the technical knowledge and skills related to~~ human factors that may impact ~~in~~ health and safety in a worksite ~~in the workplace,~~ and how they are addressed ~~as specified~~ by ~~appropriate~~ governmental regulations ~~and an understanding of personal responsibility in this area~~;	*Breakout: Health and Safety is one thing* Comments: "Human Factors" and "Health and Safety" are aviation industry standard phrases
(F)	explain the role of human factors and demonstrate personal responsibility to maintain health and safety in the workplace;	Broke this out from (E) above per comments
(G)~~(F)~~	identify and explain how employees' personal responsibility and other human factors, including personal attitudes, can affect the success and profitability of a workplace ~~demonstrate awareness of the technical knowledge, skills, and attitudes related to human factors in a successful and profitable workplace and the role of the employee in creating that success, including personal responsibility~~; ~~and~~	Removed a verb to avoid (demonstrate)
(H)~~(G)~~	apply reasoning skills to a variety of simulated workplace situations in order to make ethical decisions;~~.~~	No Change
(I)	identify standards of industry related employee appearance and health habits;	added to conform to the three other courses
(J)	practice effective written and oral communication skills; and	added to conform to the three other courses
(K)	identify and practice effective listening skills.	added to conform to the three other courses
(2)	The student relates academic skills to the requirements of aircraft maintenance and repair. The student is expected to:	No Change
(A)	demonstrate effective oral and written communication skills with individuals from various cultures such as fellow workers, management, and customers;	No Change – we feel there are lots of ways to measure this activity
(B)	identify requirements of work orders and technical documents ~~related paperwork~~ for repairs;	We felt "paperwork" was not specific enough
(C)	locate~~, read, understand the function of,~~ and interpret documents, including schematics, charts, graphs, drawings, blueprints, wiring diagrams, service-repair manuals, ~~and~~ service bulletins, type certificate data sheets, supplemental type certificates, airworthiness directives, ~~and~~ federal aviation regulations, and advisory information;	Removed "read, understand" because it is part of interpreting. Unnecessary. fixed too many "and" statements

(D)	demonstrate proficiency in ~~an understanding of~~ metric and U.S. customary standard measurement systems;	No Change – Math CCRS changed understanding to proficiency
(E)	perform precision measurements~~,~~ using ~~including the use of~~ engineering scales, dial calipers, and Vernier micrometers~~, and use specifications~~ to ~~diagnose component wear and~~ determine if a ~~the~~ component is within tolerance of ~~the~~ specifications; and	– Math CCRS
(F)	use ~~develop~~ critical-thinking ~~skills~~ and problem-solving skills to identify aircraft maintenance ~~solve~~ problems and recommend solutions~~make decisions~~.	Better action verbs that describe the task
(3)	The student will demonstrate an awareness of aviation history. The student is expected to:	We wanted to include a section on the history and social contributions aviation has made in our culture.
(A)	research and discuss historical interest in flight;	
(B)	describe early aircraft designs such as lighter than air or heavier than air designs;	
(C)	research and describe the contributions of at least four pioneers in aviation history, including Charles Taylor;	
(D)	identify driving forces that provided rapid advancement in aircraft and performance; and	
(E)	describe contributions aviation and aerospace have made to society.	
(4~~3~~)	The student uses regulatory and industry standards and demonstrates ~~understands the~~ technical knowledge and skills for **aircraft maintenance and repair**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify and locate ~~demonstrate knowledge of~~ aviation regulations prescribed by the Code of Federal Regulations, Title 14, Chapter I, ~~Volumes I-III,~~ that govern mechanic privileges and the construction, maintenance, and service of aircraft;	Better action verbs that describe the task, and corrected CFR reference.
(B)	apply ~~and understand~~ the principles of simple machines, basic aerodynamics, aircraft structures, and theory of flight to accomplish an assigned task;	"understand" is redundant. added something to APPLY the principles TO
(C)	identify ~~demonstrate knowledge of~~ aircraft categories such as *airplane, rotorcraft, glider, and lighter-than-air*, based on ~~as used with respect to~~ the certification, ratings, privileges, and limitations of airmen~~, including *airplane, rotorcraft, glider, and lighter-than-air*~~;	Better action verbs that describe the task. Reworded for clarity
(D)	identify and compare ~~demonstrate knowledge of~~ airframe construction and basic repair methods and techniques, including wood structures, metal tubular structures, fabric coverings, sheet metal, and composite structures;	Better action verbs that describe the task

(E)	identify and explain ~~demonstrate knowledge of~~ airframe systems and components, their functions, and basic operating principles, including landing gear, hydraulic power, cabin atmosphere control systems, and electrical systems;	Better action verbs that describe the task
(F)	describe ~~demonstrate knowledge of~~ aircraft reciprocating and turbine engines, their operating theory, functions, and basic repair methods and techniques;	Better action verbs that describe the task
(G)	identify and explain ~~demonstrate knowledge of~~ powerplant systems and components, their functions, and basic operating principles, including engine instruments, electrical systems, lubrication systems, ignition and starting systems, cooling systems, exhaust systems, and propellers;	Better action verbs that describe the task
(H)	explain ~~demonstrate knowledge of~~ aircraft common terminology and standard practices required to complete maintenance, modifications, and repairs;	Better action verbs that describe the task. CCRS for vocabulary
(I)	identify necessary elements of ~~discuss the completion of~~ logbook~~s~~ entries ~~and computer applications~~ and critique sample logbook entries ~~to maintain required aircraft documents~~; and	Better action verbs that describe the task
(J)	describe ~~demonstrate an understanding of the regular audits and~~ inspections required to maintain compliance with airworthiness, safety, health, and environmental regulations.	Better action verbs that describe the task
(5~~4~~)	The student understands the function and application of the tools, equipment, technologies, and preventative maintenance used in aircraft maintenance and repair. The student is expected to:	No Changes
(A)	identify and demonstrate ~~knowledge and~~ basic skills in safely using hand and power tools and equipment commonly employed in the maintenance and repair of aircraft;	
(B)	research and explain ~~demonstrate knowledge of~~ the proper handling and disposal of environmentally hazardous materials used in servicing aircraft;	Better action verbs that describe the task
(C)	research and describe ~~understand~~ the impact of new and emerging aircraft technologies; and	Better action verbs that describe the task
(D)	identify and examine ~~understand~~ the need for preventative maintenance procedures and practices.	Better action verbs that describe the task
(6~~5~~)	The student uses regulatory and industry standards and demonstrates ~~applies the~~ technical knowledge and skills of the trade, utilizing aircraft, aircraft training devices, or equivalent ~~to~~ simulated situations. The student is expected to:	No Change
(A)	start and ground operate an aircraft or simulated aircraft using a high-fidelity flight simulator with a physical yoke and pedal device;	Fixed the hyphen
(B)	research and locate appropriate documentation to perform a function in a written work order and complete the required logbook entry;	No Change

(C)	draw top, side, and front views of various aircraft categories, including airplane, rotorcraft, glider, and lighter-than-air;	No Change
(D)	perform basic airframe and engine inspections according to a checklist;	Specified standard to the work
(E)	use ~~construct~~ an engine troubleshooting chart to show the results of simple defects on engine performance; ~~showing resulting effects on engine performance as a result of simple defects;~~ and	Was too high-level for an intro course.
(F)	discuss and describe preventative maintenance plans and systems to keep aircraft systems in operation.	Better action verbs that describe the task
(7~~6~~)	The student demonstrates appropriate interpersonal and communication skills. The student is expected to:	No Change
(A)	describe and apply ethical and legal responsibilities appropriate to the workplace;	No Change
(B)	demonstrate appropriate ~~proper~~ etiquette and behavior;	Better verb
(C)	identify standards ~~benefits~~ of industry related employee ~~personal~~ appearance and health habits;	Modified to put focus on industry standards instead of normative expectations
(D)	practice effective written and oral communication skills; and	No Change
(E)	employ effective listening skills.	No Change
~~(7)~~	~~The student demonstrates knowledge of and how to develop an occupational experience program as it relates to the aircraft industry. The student is expected to:~~	Removed to put in Powerplant (PP) and Airframe (AF)
~~(A)~~	~~demonstrate knowledge of practice proper record-keeping skills as related to industry-based occupational experiences;~~	Removed to put in PP and AF
~~(B)~~	~~participate in youth leadership opportunities to create a well-rounded occupational experience;~~	Removed to put in PP and AF
~~(C)~~	~~produce a program of activities for a career and technical student organization or other leadership opportunity; and~~	Removed to put in PP and AF
~~(D)~~	~~research and develop an effective work plan and budget.~~	Removed to put in PP and AF

§127.XXX. Aircraft Maintenance Technology (One Credit), Adopted 2024.		
TEKS with edits		Work Group Comments/Rationale
(a)	General Requirements. This course is recommended for students in Grades 9-12. Prerequisites: Introduction to Aircraft Technology. Students shall be awarded one credit for successful completion of this course.	done
(b)	Introduction.	done
(1)	Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.	done
(2)	The Transportation, Distribution, and Logistics Career Cluster focuses on planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance.	done
(3)	Aircraft Maintenance is designed to teach the theory of operation, general maintenance, and repair practices of Federal Aviation Administration (FAA) general curriculum subjects utilizing aircraft, aircraft training devices, or equivalent simulated situations. In this course, the academic and technical skills are separated to reflect the learning outcomes as designed in the FAA airman certification standards. Maintenance and repair practices include knowledge of the function, diagnosis, and service of aircraft and their associated equipment. Industry recognized professional licensures, certifications, and registrations are available for students who meet the requirements set forth by the accrediting organization.	New course description
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	done
(5)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	done
(6)	The FAA uses standard terms that contain specific expectations for performance. The terms are defined as follows:	These come from the FAA and are used in the Airman Certification Standards for aviation maintenance.
(A)	Check means to verify proper operation.	
(B)	Inspect means to examine with or without inspection enhancing tools or equipment.	
(C)	Overhaul means to disassemble, clean, inspect, repair as necessary, and reassemble.	
(D)	Repair means to correct a defective condition.	
(E)	Service means to perform functions that assure continued operation.	

(F)	Troubleshoot means to analyze and identify malfunctions.	
(7)	When a student performs an action such as checking, inspecting, overhauling, repairing, servicing, troubleshooting, and installing in this course, they are to complete all associated tasks. If an action detects a flaw, defect, or discrepancy in an aircraft or component, that finding could trigger another maintenance action. Actions may include documenting findings through logbook entries, maintenance action forms, installation plans, and work orders.	
(c)	Knowledge and skills.	done
(1)	The student demonstrates professional standards, interpersonal communication, and employability skills as required by business and industry. The student is expected to:	done
(A)	identify employment opportunities, including entrepreneurship opportunities, and certification requirements for the field of aircraft maintenance and repair;	done
(B)	identify and demonstrate ways to contribute and collaborate as an effective member of a team;	ELA CCRS III A 1, 2, 4 ELA CCRS IV A 1,2
(C)	identify individual ethical and legal behavior standards according to professional and regulatory agencies;	done
(D)	research Federal Aviation Regulations and discuss the impact of the English language proficiency requirements as proscribed by the Federal Aviation Regulations;	ELA CCRS III A 1, 2, 4
(E)	identify and explain the technical knowledge and skills related to human factors in health and safety in the workplace, as specified by appropriate governmental regulations	ELA CCRS I A 1, 2 ELA CCRS III A 1, 5 ELA CCRS V B 1
(F)	identify and explain the technical knowledge and skills related to human factors in health and safety in the workplace, regarding personal responsibility in this area;	ELA CCRS I A 1, 2 ELA CCRS III A 1, 5
(G)	demonstrate awareness of the technical knowledge, skills, and attitudes related to human factors in a successful and profitable workplace, and the role of the employee in creating that success, including personal responsibility;	done
(H)	apply reasoning skills to a variety of workplace situations to make ethical decisions;	No Change ELA CCRS I A 1, 2 ELA CCRS III A 1, 2, 4, 5
(I)	identify standards of industry related employee appearance and health habits;	Better verb
(J)	practice effective written and oral communication skills;	Modified to put focus on industry standards instead of normative expectations
(K)	identify and practice effective listening skills; and	ELA CCRS I A 1-5 ELA CCRS III A 1-5
(L)	define and apply FAA standard terms that contain specific expectations for performance, including check, inspect, overhaul, repair, service, and troubleshoot.	ELA CCRS IV A 1-5

(2)	The student relates academic skills to the requirements of human factors. The student is expected to:	ALL OF THESE RELATE TO FAA AIRMAN CERTIFACTION STANDARDS GENERAL SUBJECTS
(A)	describe safety culture and organizational factors in the work environment;	ELA CCRS I A 1, 2, 3 ELA CCRS III A 1, 2, 4, 5
(B)	identify and explain types of human error and human error principles; and	ELA CCRS I A 1, 2 ELA CCRS III A 1, 2, 4, 5
(C)	identify and discuss the chain-of-events theory, including pre-conditions and conditions for unsafe acts;	ELA CCRS I A 1, 2 ELA CCRS III A 1, 2, 4, 5
(D)	identify and discuss the twelve common causes of mistakes in the aviation workplace; and	ELA CCRS I A 1, 2 ELA CCRS III A 1, 2, 4, 5
(E)	research and discuss the purpose of safety management systems in the aviation workplace.	ELA CCRS I A 1, 2 ELA CCRS III A 1, 2, 4, 5
(3)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for human factors, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	complete and submit a malfunction and defect report; and	
(B)	research and report on information regarding human factor errors.	ELA CCRS I A 1, 2, 3, 5 ELA CCRS III A 1, 2, 4, 5 ELA CCRS V A 2 ELA CCRS V B 1, 3 ELA CCRS V C 1
(4)	The student relates academic skills to the requirements of aviation mathematics. The student is expected to:	
(A)	perform algebraic operations involving addition, subtraction, multiplication, division, positive and negative numbers;	Math CCRS I B 2 Math CCRS II B 1 Math CCRS VII A 3 Math CCRS VII D 1 Math CCRS IX A 1-2 Math CCRS IX B 1-3
(B)	determine areas and volumes of various geometric shapes;	Math CCRS III D 2 Math CCRS VII A 1-3 Math CCRS VII D 1 Math CCRS VIII A 3
(C)	solve ratio, proportion, and percentage problems; and	Math CCRS I B 2 Math CCRS VII B 1
(D)	extract roots and raise numbers to a given power.	Math CCRS I B 2 Math CCRS VII A 1-3

(5)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for aviation mathematics, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	compute the volume of a shape such as a baggage compartment, fuel tanks, or an engine cylinder;	Math CCRS III D 2 Math CCRSVII A 1-3 Math CCRS VII B 1 Math CCRS VII D 1
(B)	compute the area of an aircraft wing;	Math CCRS III D 2 Math CCRSVII A 1-3 Math CCRS VII B 1 Math CCRS VII D 1
(C)	convert between fractions and decimals;	Math CCRSVII A 1-3 Math CCRS VII B 1 Math CCRS VII D 1
(D)	compute torque value conversions between inch-pounds and foot-pounds and back; and	Math CCRS I C 2
(E)	compute the compression ratio of a reciprocating engine cylinder.	Math CCRS I C 1 Math CCRSVII A 1-3 Math CCRS VII B 1 Math CCRS VII D 1
(6)	The student relates academic skills to the requirements of fundamentals of electricity and electronics. The student is expected to:	
(A)	explain electron theory, including magnetism, capacitance, induction, direct current electrical circuits, and alternating current electrical circuits;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(B)	explain electrical laws and theory, including Ohm's Law, Kirchoff's Law, Watt's Law, Faraday's Law, Lenz's Law, and Right-hand motor rule;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(C)	identify and explain electrical measurement tools that measure voltage current, resistance, and power;	
(D)	identify and discuss electrical measurement principles for measuring voltage current, resistance and power;	
(E)	identify and explain electrical measurement procedures for measuring voltage current, resistance, and power;	
(F)	compare types of batteries; and	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(G)	compare series circuits and parallel circuits.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5

(7)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for fundamentals of electricity and electronics, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	use multimeters, including performing circuit continuity tests, testing a switch and fuse, and measuring voltage, current, and resistance;	
(B)	interpret aircraft electrical circuit diagrams and symbols;	
(C)	inspect and service aircraft battery; and	
(D)	identify faults in circuits by using appropriate troubleshooting techniques.	
(8)	The student relates academic skills to the requirements of physics for aviation. The student is expected to:	
(A)	explain the theory of flight, including lift, weight, thrust, and drag, as they relate to Bernoulli's Principle, Newton's Laws of Motion, and fluid mechanics;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(B)	describe the function and operation of aircraft flight controls and additional aerodynamic devices, including vortex generators, wing fences, and stall strips; and	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(C)	analyze and compare standard atmospheric factors affecting atmospheric conditions, including the relationship between temperature, density, weight, and volume.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(9)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for physics for aviation, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	determine density and pressure altitude;	
(B)	identify changes to pressure and velocity of a fluid as it passes through a venturi;	
(C)	calculate force, area, and pressure for a given scenario; and	Math CCRS VII A 1, 3 Math CCRS IX A 1, 2 Math CCRS IX B 1-3
(D)	calculate the lift of an aircraft and determine if it will climb, descend, or maintain altitude given its weight.	Math CCRS VII A 1, 3 Math CCRS IX A 1, 2 Math CCRS IX B 1-3
(10)	The student relates academic skills to the requirements of weight and balance. The student is expected to:	
(A)	describe the purpose for weighing an aircraft and determining its center of gravity;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(B)	explain the weighing procedures of an aircraft, including the general preparation for weighing, with emphasis on aircraft weighing area considerations;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5

(C)	explain the procedures and purpose for calculating weight and center of gravity limits, including arm, positive and negative moment, center of gravity, and moment index; and	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(D)	identify adverse loading considerations, proper empty weight configuration, and ballast placement.	
(11)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for weight and balance, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	calculate aircraft weight and balance, including equipment changes, empty weight, and empty weight center of gravity; and	Math CCRS VII A 1, 3 Math CCRS IX A 1, 2 Math CCRS IX B 1-3
(B)	locate datum, weight and balance information, placarding, and limitation requirements for an aircraft in an appropriate reference such as the type certificate data sheet;	ELA CCRS V B 1-3; Datum is necessary
(12)	The student relates academic skills to the requirements of aircraft drawings. The student is expected to:	
(A)	identify and use aircraft drawing terminology;	ELA CCRS II B 1-3
(B)	interpret aircraft drawings, blueprints, sketches, charts, graphs, system schematics related to repairs, alterations, and inspections;	ELA CCRS II A 1, 4 ELA CCRS V B 1-3
(13)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for aircraft drawings, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify the meaning of lines and symbols used in an aircraft drawing;	
(B)	interpret dimensions used in an aircraft drawing;	
(C)	identify changes to aircraft drawings; and	
(D)	identify material requirements indicated by an aircraft drawing.	
(14)	The student relates academic skills to the requirements of regulations, forms, and publications. The student is expected to:	
(A)	identify the privileges and limitations of mechanic certificates, recency of experience requirements, and how to reestablish them once they are lost;	
(B)	define maintenance terminology as defined in 14 Code of Federal Regulations (CFR) Part 1, including time in service, maintenance, preventive maintenance, major alteration, major repair, minor alteration, and minor repair;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5

(C)	describe requirements for maintenance record entries for approval for return to service after maintenance, alterations, and inspections;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(D)	identify compliance requirements for manufacturer-specified maintenance methods, techniques, practices, and inspection intervals;	
(E)	explain FAA-approved maintenance data, including maintenance manuals and other methods acceptable by the administrator; and	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(F)	describe mechanic change of address notification procedures.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(15)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for regulations, forms, and publications, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	evaluate a 100-hour inspection aircraft maintenance record entry for accuracy;	ELA CCRS III D 1
(B)	locate applicable FAA aircraft specifications and FAA Type Certificate Data Sheets (TCDS) for an aircraft or component;	ELA CCRS V B 1-3
(C)	determine the conformity of aircraft instrument range markings and placarding;	
(D)	use a manufacturer's illustrated parts catalog to locate specific part numbers for aircraft parts such as door handles, rudder pedals, or seat latches;	ELA CCRS V B 1-3
(E)	determine whether a given repair or alteration is major or minor; and	
(F)	explain the difference between approved data, such as data required for major repairs or alterations and acceptable data, such as data required for minor repairs or alterations.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(16)	The student relates academic skills to the requirements of fluid lines and fittings. The student is expected to:	
(A)	identify rigid tubing and flexible hose materials, applications, sizes, and fittings;	Refer to wg breakouts for clarification
(B)	describe rigid tubing and flexible hose fabrication, installation, and inspection techniques;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(C)	explain the importance of properly using a torque wrench and torque seal when securing fluid hose and line fittings; and	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(D)	analyze and describe the risks associated with high-pressure hydraulic system configuration prior to and during maintenance.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5

(17)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for fluid lines and fittings, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	fabricate and install a rigid line with a flare and a bend;	
(B)	fabricate and install a flexible hose; and	
(C)	perform a rigid line and flexible hose inspection.	
(18)	The student relates academic skills to the requirements of aircraft materials, hardware, and processes. The student is expected to:	
(A)	identify material markings and hardware markings commonly used in aircraft and describe their general application;	
(B)	compare suitability and compatibility of materials and hardware used for maintenance;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(C)	explain forces placed on aircraft materials, including tension, compression, torsion, bending, strain, and shear;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(D)	identify safety wire and safety clip requirements and techniques;	
(E)	describe precision measurement tools, principles, and procedures;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(F)	explain soldering preparation, types of solder, and flux usage;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(G)	analyze torquing tools, principles, and procedures and the relationship between torque and fastener preload; and	
(H)	differentiate between the characteristics of acceptable and unacceptable welds.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(19)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for aircraft materials, hardware, and processes, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	select aircraft materials and hardware, such as bolts, turnbuckles, washers, and rivets, based on manufacturer's markings appropriate for a specific scenario;	
(B)	install safety wire on hardware such as nuts, bolts, and turnbuckles;	
(C)	check for proper calibration of a precision-measurement tool and record precision measurements with an instrument that has a Vernier scale;	
(D)	determine required torque values and properly torque aircraft hardware; and	
(E)	inspect and differentiate between acceptable and unacceptable welds.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5

(20)	The student relates academic skills to the requirements of ground operations and servicing. The student is expected to:	
(A)	describe proper towing and securing procedures for aircraft using approved data;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(B)	describe proper aircraft ground servicing, including oil, oxygen, hydraulic, pneumatic, and deicing systems, and fueling and defueling procedures;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(C)	differentiate between characteristics of aviation gasoline, turbine fuels, and fuel additives;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(D)	explain engine starting, ground operation, aircraft taxing procedures;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(E)	explain airport operation area procedures and air traffic control communications, including runway incursion prevention;	
(F)	identify the types and classes of fire extinguishers;	
(G)	analyze the importance of proper tool and hardware use and accountability;	
(H)	describe the need for proper material handling and parts protection;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(I)	identify hazardous materials, locate the appropriate Safety Data Sheet (SDS), and select the indicated personal protection equipment; and	
(J)	analyze and describe the potential effects of foreign object damage on aircraft.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(21)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for ground operations and servicing, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	perform a foreign object damage control procedure;	
(B)	connect external power to an aircraft;	
(C)	prepare an aircraft for towing;	
(D)	use appropriate hand signals for the movement of aircraft;	
(E)	identify different grades of aviation fuel and select an approved fuel for an aircraft;	
(F)	prepare an aircraft for fueling and inspect an aircraft fuel system for water and foreign object debris (FOD) contamination;	
(G)	follow a checklist to start up or shut down an aircraft reciprocating or turbine engine;	
(H)	identify procedures for extinguishing fires in an engine induction system;	

(I)	secure an aircraft by locating and following the correct procedures for a turbine-powered aircraft after engine shutdown; and	
(J)	locate and explain procedures for securing a turbine-powered aircraft after engine shutdown.	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(22)	The student relates academic skills to the requirements of cleaning and corrosion control. The student is expected to:	
(A)	explain the need for aircraft cleaning procedures;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(B)	explain corrosion theory, including types and effects of corrosion, corrosion-prone areas in aircraft, and corrosion preventive maintenance procedures;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(C)	describe corrosion identification and inspection techniques, corrosion removal and treatment procedures, the selection of optimal corrosion preventive compounds (CPC), the frequency of treatment, and CPC such as waxy sealants and thin-film dielectrics;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(D)	describe the use of high-pressure application equipment;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(E)	identify and discuss the effects of improper use of cleaners on aluminum or composite materials;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(F)	explain accelerated corrosion caused by dissimilar metals and the role of protective barriers to mitigate this risk, including conversion coatings, materials used for protection of airframe structures, and primer materials;	ELA CCRS I A 1, 2, 5 ELA CCRS III A 1, 2, 5
(G)	identify topcoat materials and discuss concerns regarding surface preparation for a desired finishing material, effects of ambient conditions on finishing materials, and effects of improper surface preparation on finishing materials; and	
(H)	identify health concerns when using paints, solvents, finishing materials, and processes, including the use of personal protective equipment.	
(23)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for cleaning and corrosion control, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify types of protective finishes;	
(B)	inspect finishes for corrosion and identify, select, and use aircraft corrosion prevention and cleaning materials; and	
(C)	apply aircraft corrosion prevention and coating materials.	

§127.XXX ~~130.453~~. Aircraft Airframe Technology (Two Credits), Adopted 2024~~2015~~.		
	TEKS with edits	Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 10-12. Prerequisite: Introduction to Aircraft Technology~~.~~ and Aircraft Maintenance. Students shall be awarded two credits for successful completion of this course.	Added new course offering to prereq
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.	Can't change
(2)	The Transportation, Distribution, and Logistics Career Cluster focuses on planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance.	Can't change
(3)	Aircraft Airframe Technology is designed to teach the theory of operation of aircraft airframes and associated maintenance and repair practices of Federal Aviation Administration (FAA) airframe curriculum subjects utilizing aircraft, aircraft training devices, or equivalent simulated situations. In this course, the academic and technical skills are separated to reflect the learning outcomes as designed in the FAA airman certification standards. Airframe maintenance and repair practices include knowledge of the theory, function, diagnosis, and service of airframe structures, 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.	Improved language
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	Can't change
(5)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	Can't change
(6)	The FAA uses standard terms that contain specific expectations for performance. The terms are defined as follows:	These come from the FAA and are used in the Airman Certification Standards for aviation maintenance.
(A)	Check means to verify proper operation.	
(B)	Inspect means to examine with or without inspection enhancing tools or equipment.	
(C)	Overhaul means to disassemble, clean, inspect, repair as necessary, and reassemble.	
(D)	Repair means to correct a defective condition.	

(E)	Service means to perform functions that assure continued operation.	
(F)	Troubleshoot means to analyze and identify malfunctions.	
(7)	When a student performs an action such as checking, inspecting, overhauling, repairing, servicing, troubleshooting, and installing in this course, they are to complete all associated tasks. If an action detects a flaw, defect, or discrepancy in an aircraft or component, that finding could trigger another maintenance action. Actions may include documenting findings through logbook entries, maintenance action forms, installation plans, and work orders.	
(c)	Knowledge and skills.	Can't change
(1)	The student demonstrates professional standards ~~/*employability skills*~~, interpersonal communication, and *employability skills* as required by business and industry. The student is expected to:	Merged with item (6) [in purple below]
(A)	identify and compare employment opportunities, including entrepreneurship opportunities, and certification requirements for the field of aircraft maintenance and repair;	Added higher order task
(B)	identify and demonstrate ways to contribute and collaborate as an effective member of a team; ~~demonstrate the principles of group participation and leadership related to citizenship and career preparation;~~	
(C)	identify individual ethical and legal behavior standards according to professional and regulatory agencies; ~~evaluate employers' expectations and appropriate work habits;~~	
(D)	research Federal Aviation Regulations and discuss the impact of the English language proficiency requirements as prescribed by the Federal Aviation Regulations; ~~discuss the competencies related to resources, information systems, and technology;~~	
(E)	identify and explain ~~demonstrate awareness of the technical knowledge and skills related to~~ human factors that may impact health and safety in a worksite ~~in the workplace~~ and how they are addressed ~~as specified~~ by ~~appropriate~~ governmental regulations ~~and an understanding of personal responsibility in this area~~;	Breakout: Health and Safety is one thing
(F)	explain the role of human factors and demonstrate personal responsibility to maintain health and safety in the workplace;	Broke this out from (E) above per comments
(G) ~~(F)~~	identify and explain how employees' personal responsibility and other human factors, including personal attitudes, can affect the success and profitability of a workplace ~~demonstrate awareness of the technical knowledge, skills, and attitudes related to human factors in a successful and profitable workplace and the role of the employee in creating that success, including personal responsibility~~;	Removed a verb to avoid (demonstrate)
(H) ~~(G)~~	apply reasoning skills to a variety of simulated workplace situations in order to make ethical decisions;	

(I)	*identify* standards *of* industry related employee *appearance and health habits;*	Merged with item (6) [in purple below]
(J)	identify and *practice* effective *written and oral communication skills;*	Merged with item (6) [in purple below]
(K)	identify and practice *effective listening skills;* and	Merged with item (6) [in purple below]
(L)	define and apply FAA standard terms that contain specific expectations for performance, including check, inspect, overhaul, repair, service, and troubleshoot.	
~~(2)~~	~~The student relates academic skills to the requirements of aircraft maintenance and repair. The student is expected to:~~	FAA has substantively changed the learning outcomes for Airframe and Powerplant Mechanics. As a result, we find the most effective path is to strike out the previous entries and start fresh.
~~(A)~~	~~demonstrate effective oral and written communication skills with individuals from various cultures such as fellow workers, management, and customers;~~	
~~(B)~~	~~identify requirements of work orders and related paperwork for repairs;~~	
~~(C)~~	~~develop an understanding of how to estimate parts and labor costs on airframe repair orders;~~	
~~(D)~~	~~locate, read, understand the function of, and interpret documents, including schematics, charts, graphs, drawings, blueprints, wiring diagrams, 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; and~~	
~~(G)~~	~~employ critical thinking skills and structured problem solving skills to diagnose airframe system malfunctions, solve problems, and make decisions.~~	
~~(3)~~	~~The student knows the technical knowledge and skills of aircraft services. 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 knowledge of aircraft categories as used with respect to the certification of aircraft based upon intended use or operating limitations such as transport, normal, utility, acrobatic, limited, restricted, and provisional;~~	
~~(C)~~	~~apply the principles of basic aerodynamics, theory of flight, and the function of primary and secondary flight controls;~~	

~~(D)~~	~~demonstrate knowledge of aircraft weight and balance and how repairs, alterations, and loading can adversely affect safe operation of an aircraft;~~	
~~(E)~~	~~demonstrate knowledge of aircraft finishes and corrosion prevention and removal processes;~~	
~~(F)~~	~~demonstrate knowledge of airframe construction and detailed repair methods and techniques, including wood structures, metal tubular structures, fabric coverings, sheet metal, and composite structures;~~	
~~(G)~~	~~demonstrate knowledge of aircraft assembly and rigging procedures such as structure alignment checks, balancing flight control surfaces, removing and installing flight control surfaces, and jacking aircraft;~~	
~~(H)~~	~~demonstrate knowledge of airframe systems and components, their functions, and detailed operating principles, including landing gear, hydraulic power, cabin atmosphere control systems, aircraft instrument systems, aircraft navigation and electronic communication systems, ice and rain control systems, fire protection systems, and electrical systems;~~	
~~(I)~~	~~demonstrate knowledge of aircraft common terminology and standard practices required to complete maintenance, modifications, and repairs; and~~	
~~(J)~~	~~discuss the completion of logbooks and computer applications to maintain required aircraft documents.~~	
~~(4)~~	~~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:~~	
~~(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;~~	
~~(B)~~	~~demonstrate knowledge of the proper handling and disposal of environmentally hazardous materials used in servicing aircraft;~~	
~~(C)~~	~~research and understand the impact of new and emerging aircraft technologies; and~~	
~~(D)~~	~~identify and understand the need for preventative maintenance procedures and practices.~~	
~~(5)~~	~~The student applies the technical knowledge and skills of the trade to simulated and actual work situations. The student is expected to:~~	
~~(A)~~	~~accurately calculate aircraft weight and balance;~~	
~~(B)~~	~~accurately determine airframe component wear by using precision measuring and published specifications to determine if a given component is within wear tolerance and research necessary repairs;~~	

(C)	build and fly a paper airplane with simple flight control surfaces that will predictably complete an objective;	
(D)	research proper repair methods for a simulated repair and write a work order that calls out specific maintenance references and estimates cost of repairs;	
(E)	create an appropriate inspection checklist for a given airframe based on regulated mandatory inspection points for an annual inspection and perform the inspection;	
(F)	fabricate an example or simulated example of an airframe construction and repair method such as wood structures, metal tubular structures, fabric coverings, sheet metal, or composite structures;	
(G)	describe the detailed function and operation of an airframe system using drawings and written descriptions;	
(H)	construct an airframe system troubleshooting chart showing possible defects and resulting effects on system performance;	
(I)	apply the essential knowledge and skills in aircraft maintenance and repair to work-based learning experiences such as cooperative education, job shadowing, mentoring, and apprenticeship training;	
(J)	indicate and select proper products used in preventative maintenance for a given aircraft from appropriate maintenance publications; and	
(K)	perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations.	
(6)	*The student demonstrates appropriate interpersonal and communication skills. The student is expected to:*	Moved to (c)(1)
(A)	describe and apply ethical and legal responsibilities appropriate to the workplace;	
(B)	demonstrate the uses of proper etiquette and behavior;	
(C)	*identify benefits of personal appearance and health habits;*	
(D)	*practice written and oral communication skills; and*	
(E)	employ *effective listening skills.*	
(7)	The student learns the value of and how to develop an occupational experience program as it relates to the aircraft industry. The student is expected to:	
(A)	apply proper record-keeping skills as related to industry-based occupational experiences;	

~~(B)~~	~~participate in youth leadership opportunities to create a well-rounded occupational experience;~~	
~~(C)~~	~~produce a program of activities for a career and technical student organization or other leadership opportunity; and~~	
~~(D)~~	~~develop a work plan and budget.~~	
(2)	The student relates academic skills to the requirements of **metallic structures**. The student is expected to:	
(A)	describe best practices for maintenance safety, including the use of personal protective equipment (PPE), and precautions for sheet metal repairs and fabrication;	
(B)	identify characteristics and types of metallic structures;	
(C)	identify types of sheet metal defects and select sheet metal repair materials;	
(D)	explain inspection and testing processes of metal structures;	
(E)	explain the selection of rivets, hardware, and fasteners for a sheet metal repair, per FAA approved data;	
(F)	explain the layout, forming, and drilling of sheet metal components, per FAA approved data; and	
(G)	explain rivet layout, installation, and removal, per FAA approved data.	
(3)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **metallic structures**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	install and remove solid rivets, such as universal head, countersink head, and blind rivets;	
(B)	create a drawing of a repair, including the number of rivets and size of sheet metal required, utilizing a manufacturer's structural repair manual;	
(C)	design a rivet pattern for a specific repair;	
(D)	determine applicability of sheet metal for a repair in a specific application;	
(E)	design a repair using a manufacturer's structural repair manual;	
(F)	sketch and build a piece of sheet metal to fit a prepared area; and	
(G)	determine extent of damage and decide if metallic structure is repairable.	

(4)	The student relates academic skills to the requirements of **non-metallic structures**. The student is expected to:	
(A)	identify and discuss maintenance safety practices for composite materials, composite structures, and windows;	
(B)	identify and discuss tools and practices for wood structures, including inspection techniques such as determining acceptable and unacceptable wood defects;	
(C)	define and explain covering textile terms;	
(D)	define and explain covering methods of attachment commonly used, including types of approved aircraft covering material and seams commonly used with aircraft covering;	
(E)	describe inspection methods for textile aircraft coverings;	
(F)	identify and discuss composite repair methods, techniques, fasteners, and practices;	
(G)	differentiate between composite structure fiber, core, and matrix materials;	
(H)	identify and discuss types of composite structure defects such as delamination, crush core, and surface gouges;	
(I)	identify inspection and testing of composite structures such as tap testing and ultrasonics;	
(J)	identify and discuss the care and maintenance of windows;	
(K)	identify and discuss thermoplastic material inspection/types of defects;	
(L)	identify and discuss window temporary and permanent repairs;	
(M)	identify and discuss inspection of restraints and upholstery.	
(5)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **non-metallic structures**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect and repair fiberglass, composite, plastic, or glass-laminated structures;	
(B)	clean and inspect acrylic type windshields;	
(C)	perform a tap test on composite material;	
(D)	locate and explain repair procedures for elongated bolt holes; and	
(E)	perform lay up for a repair to a composite panel, including preparation for vacuum bagging, using a manufacturer's repair manual.	

(6)	The student understands the academic knowledge and skills for **flight controls**. The student is expected to:	
(A)	identify and compare types of aircraft control cables and control cable maintenance techniques;	
(B)	identify and explain the function of cable connectors, cable guides, and control stops;	
(C)	identify and explain the function of push-pull tubes and torque tubes;	
(D)	identify and explain the function of bellcranks;	
(E)	explain the purpose of maintaining a calibration schedule for cable tension meters and other rigging equipment;	
(F)	explain the use and interpretation of cable tensiometer equipment and a cable tension chart;	
(G)	define and explain flutter and flight control balance;	
(H)	identify and explain primary aircraft flight controls, stabilizer systems, and flight control rigging; and	
(I)	identify and explain secondary and auxiliary control surfaces and other aerodynamic wing features.	
(7)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **flight controls**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify fixed-wing aircraft rigging adjustment locations;	
(B)	inspect and report findings on primary and secondary flight control surfaces;	
(C)	inspect and report findings on primary control cables;	
(D)	adjust and secure a primary flight control cable;	
(E)	adjust push-pull flight control systems;	
(F)	check the balance of a flight control surface and balance a control surface;	
(G)	determine allowable axial play limits for a flight control bearing; and	
(H)	identify and locate appropriate data to verify aircraft flight control travel limits.	
(8)	The student understands the academic knowledge and skills for **airframe inspection**. The student is expected to:	
(A)	explain the use of inspection requirements under 14 Code of Federal Regulations (CFR) Part 91;	

(B)	discuss maintenance recordkeeping requirements under 14 CFR Part 43.	
(C)	research and describe requirements for complying with airworthiness directives, as found in 14 CFR Part 39;	
(D)	identify and differentiate between FAA-approved data and other data sources such as manufacturer manuals;	
(E)	explain the need for compliance with service letters, service bulletins, instructions for continued airworthiness, and airworthiness directives;	
(F)	explain the purpose and methods of visual inspections;	
(G)	describe the method to select and use checklists and other maintenance publications, including service letters, service bulletins, instructions for continued airworthiness, and airworthiness directives; and	
(H)	describe the importance of maintenance record documentation.	
(9)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **airframe inspection**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	perform a portion of a 100-hour inspection in accordance with 14 CFR Part 43 such as a records check using the appropriate checklist;	
(B)	enter results of a 100-hour inspection, including airworthy and unairworthy conditions, in a maintenance record;	
(C)	analyze and inspect applicable equipment and documents to determine compliance with a specific airworthiness directive;	
(10)	The student understands the academic knowledge and skills for **landing gear**. The student is expected to:	
(A)	identify and discuss safety precautions when using aircraft jacks;	
(B)	identify and discuss safety precautions when working with high pressure fluids and gases;	
(C)	identify and discuss safety precautions in the storage and handling of hydraulic fluids;	
(D)	identify and discuss safety precautions in the operation of retractable landing gear systems around personnel;	
(E)	identify and discuss safety precautions in landing gear, tire, wheel maintenance operations;	
(F)	describe fixed and retractable landing gear systems and components;	
(G)	explain the necessity of landing gear strut servicing and lubrication;	

(H)	describe and compare the method of inspection of bungee and spring steel landing gear systems;	
(I)	describe and compare aircraft steering systems;	
(J)	explain landing gear position and warning system inspection, check, and servicing;	
(K)	explain brake assembly servicing and inspection; and	
(L)	describe and compare brake actuating systems.	
(11)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **landing gear**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect and service landing gear such as fixed or retractable systems;	
(B)	jack an aircraft for a gear retraction check;	
(C)	inspect wheels, brakes, bearings, and tires;	
(D)	bleed air from a hydraulic brake system;	
(E)	inspect a tire for defects;	
(F)	replace shock strut air valve;	
(G)	locate and explain the process for checking landing gear alignment;	
(H)	troubleshoot aircraft steering system issues such as nose-wheel shimmy;	
(I)	identify landing gear position and warning system components;	
(J)	troubleshoot landing gear position and warning systems;	
(K)	inspect a brake for serviceability; and	
(L)	inspect tube landing gear for damage.	
(12)	The student understands the academic knowledge and skills for **hydraulic and pneumatic systems**. The student is expected to:	
(A)	describe hydraulic system components, including reservoirs, filters, hoses, lines, fittings, valves, actuators, accumulators, and pumps;	
(B)	explain the function of hydraulic system components, including reservoirs, filters, hoses, lines, fittings, valves, actuators, accumulators, and pumps;	
(C)	explain hydraulic system operation, inspections, operational checks, servicing, and troubleshooting;	

(D)	describe pneumatic system components, including reservoirs, filters, hoses, lines, fittings, valves, actuators, accumulators, and pumps;	
(E)	explain the function of pneumatic system components, including reservoirs, filters, hoses, lines, fittings, valves, actuators, accumulators, and pumps;	
(F)	explain pneumatic system operation, inspections, operational checks, servicing, and troubleshooting;	
(G)	identify types of hydraulic seals and hydraulic seal fluid compatibility;	
(H)	research and identify the risks associated with high pressure gases and fluids;	
(I)	research and identify the risks of not properly relieving system pressure prior to system servicing;	
(J)	research and identify the risks associated with storage and handling of hydraulic fluids; and	
(K)	research and identify the risks of cross-contamination of hydraulic fluids.	
(13)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **hydraulic and pneumatic systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify different types of hydraulic fluids;	
(B)	install seals and backup rings in a hydraulic component;	
(C)	remove, clean, inspect, and install a hydraulic system filter;	
(D)	service a hydraulic system reservoir;	
(E)	purge air from a hydraulic system;	
(F)	inspect a hydraulic system and a pneumatic system for leaks;	
(G)	troubleshoot a hydraulic system and a pneumatic system for leaks;	
(H)	locate and explain hydraulic fluid servicing instructions;	
(I)	identify and select hydraulic fluid for a given aircraft; and	
(J)	locate installation procedures for a seal, backup ring, or gasket.	
(14)	The student understands the academic knowledge and skills for **environmental systems**. The student is expected to:	
(A)	explain the operation and purpose of pressurization systems and bleed air heating systems;	
(B)	explain and compare aircraft instrument cooling methods;	

(C)	differentiate between exhaust heat exchanger system and combustion heater system components, function, and operation;	
(D)	differentiate between vapor-cycle system and air-cycle system components, function, and operation;	
(E)	explain cabin pressurization systems, components, and operation;	
(F)	differentiate between types of aircraft oxygen systems;	
(G)	differentiate between types of aircraft oxygen system components;	
(H)	identify and assess risks associated with oxygen system maintenance;	
(I)	identify and assess risks associated with the recovery of vapor-cycle refrigerant;	
(J)	identify and assess risks associated with storage, handling, and use of compressed gas cylinders;	
(K)	identify and assess risks associated with disregarding manufacturer's recommended refrigerant servicing procedures; and	
(L)	identify and assess risks associated with maintenance of combustion heaters.	
(15)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **environment systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect and service an oxygen system;	
(B)	clean and inspect a pilot emergency oxygen mask and supply hoses;	
(C)	inspect an oxygen system cylinder for serviceability;	
(D)	locate and describe the procedures to troubleshoot a combustion heater;	
(E)	locate and describe the procedures for servicing a refrigerant (vapor-cycle) system;	
(F)	locate and describe the troubleshooting procedures for an air-cycle system;	
(G)	inspect a cabin heater system equipped with an exhaust heat exchanger for cracks; and	
(H)	locate troubleshooting procedures for a pressurization system.	
(16)	The student understands the academic knowledge and skills for **aircraft instrument systems**. The student is expected to:	
(A)	describe annunciator indicating systems and define the meaning of warning, caution, and advisory lights;	

(B)	differentiate between fuel quantity indicating systems;	
(C)	differentiate between types of gyroscopic instruments;	
(D)	explain the function and operation of:	
(i)	magnetic compasses and compass swinging procedures;	
(ii)	pressure and temperature indicating instruments;	
(iii)	position indication sensors and instruments;	
(iv)	engine indication and crew alerting systems;	
(v)	instrument vacuum and pneumatic systems;	
(vi)	pitot-static systems;	
(vii)	electronic displays and flight instrument systems;	
(viii)	transponder and encoder systems;	
(ix)	angle of attack and stall warning systems; and	
(x)	takeoff and landing gear configuration warning systems.	
(17)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **aircraft instrument systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	remove and install an aircraft instrument;	
(B)	determine barometric pressure using an altimeter;	
(C)	verify proper range markings on an instrument for a particular aircraft using approved data;	
(D)	locate the procedures for troubleshooting a vacuum-operated instrument system;	
(E)	identify exhaust gas temperature system components;	
(F)	inspect an aircraft's alternate static air source; and	
(G)	locate and explain the adjustment procedures for a stall warning system.	
(18)	The student understands the academic knowledge and skills for **aircraft communication and navigation systems**. The student is expected to:	
(A)	describe radio operating principles and radio components;	
(B)	identify and explain mounting requirements of antennas, static discharge wicks, and avionics components;	

(C)	identify the components of communication systems, including very high frequency (VHF), high frequency (HF), satellite communications (SATCOM), Aircraft Communication Addressing and Reporting System (ACARS);	
(D)	explain the basic operation of communications systems, including very high frequency (VHF), high frequency (HF), satellite communications (SATCOM), Aircraft Communication Addressing and Reporting System (ACARS);	
(E)	identify the components of emergency locator transmitters (ELT) and explain the basic operation of ELTs;	
(F)	identify the components of navigation systems, including distance measuring equipment (DME), instrument landing system (ILS), global positioning system (GPS), automatic direction finder (ADF), VHF omnidirectional range (VOR).	
(G)	explain the basic operation of navigation systems, including distance measuring equipment (DME), instrument landing system (ILS), global positioning system (GPS), automatic direction finder (ADF), VHF omnidirectional range (VOR).	
(H)	identify the components of collision avoidance systems, including radio altimeter (RA), automatic dependent surveillance-broadcast (ADS-B), traffic collision avoidance systems (TCAS) and ground proximity warning system (GPWS);	
(I)	explain the basic operation of collision avoidance systems, including radio altimeter (RA), automatic dependent surveillance-broadcast (ADS-B), traffic collision avoidance systems (TCAS) and ground proximity warning system (GPWS);	
(J)	identify the components and explain the basic operation of intercom systems;	
(K)	identify the components and explain the basic operation of weather radar;	
(L)	identify the components and explain the basic operation of autopilot and auto-throttle systems;	
(M)	research and identify the risks of improper ELT testing procedures;	
(N)	research and identify the risks of performing maintenance on high power/high frequency systems such as weather radar and SATCOM systems; and	
(O)	research and identify the risks of improper mounting of antennas.	
(19)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **aircraft communication and navigation systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	locate and explain autopilot inspection procedures;	
(B)	identify navigation and communication antennas;	

(C)	perform an operational check of a VHF communications system;	
(D)	locate proper testing procedures for an ELT, inspect ELT batteries for expiration date, and perform an operational check of an ELT; and	
(E)	locate and explain the installation procedures for antennas, including mounting and coaxial connections.	
(20)	The student understands the academic knowledge and skills for **aircraft fuel systems**. The student is expected to:	
(A)	identify fuel system types and fuel system components, including filters and selector valves;	
(B)	differentiate between types of aircraft fuel tanks and types of fuel cells;	Breakouts: break out tanks and cells separately
(C)	explain fuel flow during fuel transfer, fueling, defueling, and fuel jettisoning;	
(D)	describe characteristics of fuel types;	
(E)	describe fuel system maintenance industry best practices;	
(F)	differentiate between fuel quantity indication methods such as float type, electrical resistance, or visual indicators;	
(G)	research and identify the risks of improper fuel system maintenance;	
(H)	research and identify the risks of fuel system contamination and spills;	
(I)	research and identify the risks of fuel system maintenance requiring fuel tank entry; and	
(J)	research and identify the risks when defueling aircraft.	
(21)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **aircraft fuel systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect a metal, bladder, or integral fuel tank;	
(B)	inspect a fuel selector valve;	
(C)	drain a fuel system sump;	
(D)	service a fuel system strainer; and	
(E)	identify and locate fuel system operating instructions, inspection procedures, crossfeed procedures, required placards, and defueling procedures.	Breakout: “Fuel systems” goes with each breakout

(22)	The student understands the academic knowledge and skills for **aircraft electrical systems**. The student is expected to:	
(A)	identify the components of generators, direct current (DC) generation systems, and DC power distribution systems;	
(B)	explain the basic operation of generators, DC generation systems, and DC power distribution systems;	
(C)	identify the components of alternators, alternating current (AC) generation systems, and AC power distribution systems;	
(D)	explain the basic operation of alternators, AC generation systems, and AC power distribution systems;	
(E)	identify the components and explain the basic operation of voltage regulators, over-volt protection, and overcurrent protection;	
(F)	identify the components and explain the basic operation of inverter systems;	
(G)	explain aircraft wiring size and type selection criteria;	
(H)	explain the purpose of aircraft wiring shielding;	
(I)	explain the purpose of aircraft bonding and lightning protection;	
(J)	describe basic electrical system troubleshooting practices;	
(K)	identify soldering preparation techniques, types of solder, and flux usage;	
(L)	identify types of aircraft electrical connectors, splices, terminals, and switches;	
(M)	describe methods of aircraft battery troubleshooting and maintenance;	
(N)	research and identify the risks of testing electrical systems, including energized and non-energized systems;	
(O)	research and identify the risks of connecting and disconnecting external power;	
(P)	research and identify the risks of maintenance in areas containing aircraft wiring;	
(Q)	research and identify the risks of improperly routing and securing wires and wire bundles;	Breakout: • routing wires • securing wires • routing wire bundles • securing wire bundles
(R)	research and identify the risks of improper selection or installation of wire terminals; and	

(S)	research and identify the risks of improper soldering practices.	
(23)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **aircraft electrical systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect aircraft wiring installation and routing;	
(B)	perform wire terminating and splicing;	
(C)	identify components using a wiring circuit diagram;	
(D)	connect aircraft wires using a solder joint;	
(E)	troubleshoot a simple airframe electrical circuit;	
(F)	install bonding jumpers to electrically connect two isolated components;	
(G)	measure the resistance of an electrical system component;	
(H)	inspect and test anti-collision, position, and landing lights for proper operation;	
(I)	identify components in an electrical schematic where AC is rectified to a DC voltage;	
(J)	perform a continuity test to verify the condition of a conductor; and	
(K)	perform a test on a conductor for a short to ground.	
(24)	The student understands the academic knowledge and skills for **ice and rain control systems**. The student is expected to:	
(A)	explain causes and effects of aircraft icing;	
(B)	identify the components of ice detection systems, aircraft anti-ice systems, and de-ice systems;	
(C)	explain the basic operation of ice detection systems, aircraft anti-ice systems, and de-ice systems;	
(D)	explain wind screen rain control systems, including wiper blade, chemical, and pneumatic bleed air.	
(E)	research and identify the risks of improper ice and rain control system testing or maintenance;	
(F)	research and identify the risks of improper storage and handling of deicing fluids; and	
(G)	research and identify the risks of improper selection and use of cleaning materials for heated windshields.	

(25)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **aircraft electrical systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	clean a pneumatic deicer boot;	
(B)	locate and explain the procedures for inspecting an electrically-operated windshield wiper system;	
(C)	locate and explain the procedures for replacing blades on a windshield wiper system; and	
(D)	locate and explain the procedures for inspecting a pneumatic rain removal system.	
(26)	The student understands the academic knowledge and skills for **airframe fire protection systems**. The student is expected to:	
(A)	explain types of fires and aircraft fire zones;	
(B)	identify the components and explain the basic operation of overheat detection and warning systems;	
(C)	identify the components and explain the basic operation of fire detection and warning systems;	
(D)	identify the components and explain the basic operation of smoke and carbon monoxide detection systems;	
(E)	describe types of fire extinguishing systems and extinguishing agents;	
(F)	research and identify the risks of maintenance on circuits associated with fire bottle squibs;	
(G)	research and explain the use of PPE when working on or testing fire extinguishing systems; and	
(H)	explain the risks of exposure to fire extinguishing agents.	
(27)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **airframe fire protection systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	evaluate an installed fire extinguisher system for proper container pressure;	
(B)	locate and explain the procedures for checking a smoke detection system;	
(C)	locate and explain the procedures for inspecting an overheat detection system; and	
(D)	inspect fire protection system cylinders and check for hydrostatic test date.	

(28)	The student understands the academic knowledge and skills for **rotorcraft fundamentals**. The student is expected to:	
(A)	explain the characteristics of rotorcraft aerodynamics and flight controls;	
(B)	identify the components and explain the function of rotorcraft transmissions;	
(C)	explain the need for rigging requirements for rotary wing aircraft;	
(D)	identify rotor systems, rotor blade functions, and rotor blade construction;	
(E)	explain the need for helicopter skid shoe and tube inspections;	
(F)	explain causes of rotor system and drive system vibrations;	
(G)	explain the purpose of rotor blade track and balance;	
(H)	research and identify the risks of working around helicopter blades during ground operations;	
(I)	research and identify the risks of improper ground-handling procedures;	
(J)	research and identify the risks of ground operations and functional tests; and	
(K)	research and identify the risks of improper maintenance of rotorcraft systems and components.	
(29)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **rotorcraft fundamentals**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify components of a helicopter rotor system;	
(B)	identify and locate helicopter rotor blade track and balance procedures;	Breakout: track and balance is one thing
(C)	identify and locate procedures needed to rig helicopter controls; and	
(D)	identify and locate procedures to track and balance a rotor system.	
(30)	The student understands the academic knowledge and skills for **water and waste systems**. The student is expected to:	
(A)	identify the components and explain the basic operation of potable water systems;	
(B)	identify the components and explain the basic operation of lavatory waste systems;	
(C)	describe servicing requirements for water and waste systems;	
(D)	research and identify the need for PPE to reduce the risks associated with servicing lavatory waste systems.	

(31)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **water and waste systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	locate and explain the procedures for servicing a lavatory waste system; and	
(B)	locate and explain the procedures for servicing a potable water system.	

§127.XXX ~~130.454~~. Aircraft Powerplant Technology (Two Credits), Adopted 2024~~2015~~.		
TEKS with edits		Work Group Comments/Rationale
(a)	General requirements. This course is recommended for students in Grades 11 and 12. Prerequisite: Introduction to Aircraft Technology~~.~~ and Aircraft Maintenance. Students shall be awarded two credits for successful completion of this course.	Added new course offering to prereq
(b)	Introduction.	
(1)	Career and technical education instruction provides content aligned with challenging academic standards and relevant technical knowledge and skills for students to further their education and succeed in current or emerging professions.	Can't change
(2)	The Transportation, Distribution, and Logistics Career Cluster focuses on planning, management, and movement of people, materials, and goods by road, pipeline, air, rail, and water and related professional support services such as transportation infrastructure planning and management, logistics services, mobile equipment, and facility maintenance.	Can't change
(3)	Aircraft Powerplant Technology is designed to teach the theory of operation of aircraft powerplants and associated maintenance and repair practices of the Federal Aviation Administration (FAA) powerplant curriculum subjects utilizing aircraft, aircraft training devices, or equivalent simulated situations. In this course, the academic and technical skills are separated to reflect the learning outcomes as designed in the FAA airman certification standards. Powerplant maintenance and repair practices include knowledge of the theory, function, diagnosis, and service of powerplants, 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.	Improved language
(4)	Students are encouraged to participate in extended learning experiences such as career and technical student organizations and other leadership or extracurricular organizations.	
(5)	Statements that contain the word "including" reference content that must be mastered, while those containing the phrase "such as" are intended as possible illustrative examples.	
(6)	The FAA uses standard terms that contain specific expectations for performance. The terms are defined as follows:	These come from the FAA and are used in the Airman Certification Standards for aviation maintenance.
(A)	Check means to verify proper operation.	
(B)	Inspect means to examine with or without inspection enhancing tools or equipment.	
(C)	Overhaul means to disassemble, clean, inspect, repair as necessary, and reassemble.	
(D)	Repair means to correct a defective condition.	

(E)	Service means to perform functions that assure continued operation.	
(F)	Troubleshoot means to analyze and identify malfunctions.	
(7)	When a student performs an action such as checking, inspecting, overhauling, repairing, servicing, troubleshooting, and installing in this course, they are to complete all associated tasks. If an action detects a flaw, defect, or discrepancy in an aircraft or component, that finding could trigger another maintenance action. Actions may include documenting findings through logbook entries, maintenance action forms, installation plans, and work orders.	
(c)	Knowledge and skills.	
(1)	The student demonstrates professional standards/employability skills as required by business and industry. The student is expected to:	
(A)	identify and compare ~~discuss~~employment opportunities, including entrepreneurship opportunities, and certification requirements for the field of aircraft maintenance;	
(B)	identify and demonstrate ways to contribute and collaborate as an effective member of a team; ~~demonstrate the principles of group participation and leadership related to citizenship and career preparation;~~	
(C)	identify individual ethical and legal behavior standards according to professional and regulatory agencies; ~~evaluate employers' expectations and appropriate work habits;~~	
(D)	research Federal Aviation Regulations and discuss the impact of the English language proficiency requirements as prescribed by the Federal Aviation Regulations;~~discuss the competencies related to resources, information systems, and technology;~~	
(E)	identify and explain ~~demonstrate awareness of the technical knowledge and skills related to~~ human factors that may impact health and safety in a worksite ~~in the workplace~~ and how they are addressed ~~as specified~~ by ~~appropriate~~ governmental regulations ~~in, and an understanding of personal responsibility in this area~~;	
(F)	explain the role of human factors and demonstrate personal responsibility to maintain health and safety in the workplace;	
(G)~~(F)~~	identify and explain how employees' personal responsibility and other human factors, including personal attitudes, can affect the success and profitability of a workplace ~~demonstrate awareness of the technical knowledge, skills, and attitudes related to human factors in a successful and profitable workplace and the role of the employee in creating that success, including personal responsibility~~;	
(H)~~(G)~~	apply reasoning skills to a variety of simulated workplace situations in order to make ethical decisions;~~.~~	

(I)	*identify* standards *of* industry related employee *appearance and health habits;*	Merged with item (6) [in purple below]
(J)	identify and *practice* effective *written and oral communication skills;*	Merged with item (6) [in purple below]
(K)	identify and practice *effective listening skills;* and	Merged with item (6) [in purple below]
(L)	define and apply FAA standard terms that contain specific expectations for performance, including check, inspect, overhaul, repair, service, and troubleshoot.	
~~(2)~~	~~The student relates academic skills to the requirements of aircraft maintenance and repair. The student is expected to:~~	FAA has substantively changed the learning outcomes for Airframe and Powerplant Mechanics. As a result, we find the most effective path is to strike out the previous entries and start fresh.
~~(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 powerplant repair orders;~~	
~~(D)~~	~~locate, read, understand the function of, and interpret documents, including schematics, charts, graphs, drawings, blueprints, wiring diagrams, 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; and~~	
~~(G)~~	~~employ critical thinking skills and structured problem-solving skills to diagnose powerplant system malfunctions, solve problems, and make decisions.~~	
~~(3)~~	~~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;~~	
~~(B)~~	~~apply and understand the principles of simple machines, fluid dynamics, and heat dynamics, including Boyle's Law and Charles' Law;~~	
~~(C)~~	~~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;~~	

~~(D)~~	~~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;~~	
~~(E)~~	~~demonstrate knowledge of powerplant 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;~~	
~~(F)~~	~~review the necessary steps to perform a reciprocating engine overhaul following industry best practices;~~	
~~(G)~~	~~identify and select appropriate nondestructive testing methods for component inspections, including dye penetrant, eddy current, ultrasonic, and magnetic particle inspections;~~	
~~(H)~~	~~demonstrate knowledge of aircraft common terminology and standard practices and the tools required to complete maintenance, modifications, and repairs; and~~	
~~(I)~~	~~discuss the completion of logbooks and computer applications to maintain required aircraft documents.~~	
~~(4)~~	~~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:~~	
~~(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;~~	
~~(B)~~	~~demonstrate knowledge of the proper handling and disposal of environmentally hazardous materials used in maintaining and servicing aircraft;~~	
~~(C)~~	~~research and understand the impact of new and emerging aircraft technologies; and~~	
~~(D)~~	~~identify and understand the need for preventative maintenance procedures and practices.~~	
~~(5)~~	~~The student applies the technical knowledge and skills of the trade to simulated and actual work situations. The student is expected to:~~	
~~(A)~~	~~determine powerplant 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 powerplant 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 powerplant using drawings and written descriptions;~~	
~~(E)~~	~~describe the detailed function and operation of a reciprocating or turbine aircraft powerplant system or component using drawings and written descriptions;~~	
~~(F)~~	~~construct a detailed engine troubleshooting chart showing possible defects and resulting effects on engine performance of a reciprocating or turbine aircraft powerplant;~~	
~~(G)~~	~~apply aircraft maintenance and repair essential knowledge and skills to learning experiences such as job shadowing, mentoring, apprenticeship training, and career preparation;~~	
~~(H)~~	~~indicate and select proper products used in preventative maintenance for a given powerplant from appropriate maintenance publications; and~~	
~~(I)~~	~~perform regular audits and inspections to maintain compliance with safety, health, and environmental regulations.~~	
~~(6)~~	~~The student demonstrates appropriate interpersonal and communication skills. The student is expected to:~~	
~~(A)~~	~~describe and apply ethical and legal responsibilities appropriate to the workplace;~~	
~~(B)~~	~~demonstrate the uses of proper etiquette and behavior;~~	
~~*(C)*~~	~~*identify benefits of personal appearance and health habits;*~~	Moved above
~~*(D)*~~	~~*practice written and oral communication skills; and*~~	Moved above
~~*(E)*~~	~~*employ effective listening skills.*~~	Moved above
~~(7)~~	~~The student learns the value of and how to develop an occupational experience program as it relates to the aircraft industry. The student is expected to:~~	
~~(A)~~	~~apply proper record keeping skills as related to industry-based occupational experiences;~~	
~~(B)~~	~~participate in youth leadership opportunities to create a well-rounded occupational experience;~~	
~~(C)~~	~~produce a program of activities for a career and technical student organization or other leadership opportunity; and~~	
~~(D)~~	~~develop a work plan and budget.~~	
(2)	The student relates academic skills to the requirements of **reciprocating engines**. The student is expected to:	
(A)	identify the components and types of reciprocating internal combustion aircraft engines, including inline, opposed, V-type, and radial engines;	

(B)	explain the operational theory of reciprocating internal combustion aircraft engines, including inline, opposed, V-type, and radial engines;	
(C)	explain the purpose and methods of reciprocating engine preservation;	
(D)	explain the purpose and methods of reciprocating engine maintenance and inspection;	
(E)	locate and explain the procedures for reciprocating engine ground operations;	
(F)	identify the components of and explain the basic operation of diesel engines;	
(G)	explain the basic operational theory of diesel engines;	
(H)	research and identify the risks of maintenance that requires moving the propeller;	
(I)	research and identify the risks of ground operating a reciprocating engine;	
(J)	research and identify the actions necessary in the event of a reciprocating engine fire; and	
(K)	research and identify the risks in not using the manufacturer's procedures during maintenance.	
(3)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **reciprocating engines**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	perform and document findings from a cylinder assembly inspection;	
(B)	operate and troubleshoot a reciprocating engine;	
(C)	install a wrist pin in a piston;	
(D)	identify the parts of a cylinder and a crankshaft;	
(E)	identify and inspect bearings found in reciprocating engines; and	
(F)	inspect and rig cable and push-pull engine controls.	
(4)	The student relates academic skills to the requirements of **turbine engines**. The student is expected to:	
(A)	identify the components and types of turbine engines;	
(B)	explain the basic operational theory of turbine engines;	
(C)	explain the purpose and methods of monitoring turbine engine performance;	
(D)	explain the purpose and methods of turbine engine troubleshooting, maintenance, and inspection;	
(E)	research and explain the causes of turbine engine performance loss;	

(F)	explain the basic operational theory of bleed air systems;	
(G)	explain the purpose and methods of turbine engine preservation;	
(H)	explain the theory and application of auxiliary power units;	
(I)	research and identify the risks of turbine engine operation;	
(J)	research and identify the risks of performing maintenance on a turbine engine;	
(K)	research and identify the actions necessary in the event of a turbine engine fire; and	
(L)	research and identify the risks of foreign object damage (FOD) to turbine engines.	
(5)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **turbine engines**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify different turbine compressors;	
(B)	identify different types of turbine engine blades;	
(C)	identify components of turbine engines;	
(D)	map airflow direction and pressure changes in turbine engines;	
(E)	identify and locate the procedures for the adjustment of a fuel control unit;	
(F)	identify and locate the installation or removal procedures for a turbine engine;	
(G)	identify damaged turbine engine blades; and	
(H)	analyze causes for turbine engine performance loss.	
(6)	The student relates academic skills to the requirements of **engine inspection**. The student is expected to:	
(A)	explain the purpose of inspection requirements under 14 Code of Federal Regulations (CFR) Part 43 and 14 CFR Part 91;	
(B)	explain the purpose and methods of identification of life-limited parts and life-limited parts replacement intervals;	
(C)	explain the purpose and types of special inspections such as sudden engine stoppage, hard landings, and FOD ingestion;	
(D)	explain the purpose of using FAA-approved data;	

(E)	explain the importance of compliance with service letters, service bulletins, instructions for continued airworthiness, airworthiness directives (AD), and Type Certificate Data Sheets (TCDS);	
(F)	explain the purpose of maintenance recordkeeping requirements under 14 CFR Part 43;	
(G)	explain the purpose of engine component inspection, checking, and servicing;	
(H)	explain the importance of inspecting engine mounts and mounting hardware;	
(I)	research and identify the risks of performing a compression test on a reciprocating engine; and	
(J)	research and identify the risks of performing maintenance on an operating reciprocating and turbine engine.	
(7)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **engine inspection**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	evaluate a powerplant for compliance with FAA-approved or manufacturer data;	
(B)	perform a powerplant records inspection;	
(C)	inspect a powerplant for compliance with applicable ADs;	
(D)	determine powerplant installation eligibility in accordance with the TCDS;	
(E)	inspect engine controls for proper operation and adjustment;	
(F)	inspect an aircraft engine accessory for serviceability;	
(G)	inspect engine records for time or cycles on life-limited parts;	
(H)	perform an engine start and inspect engine operational parameters; and	
(I)	inspect an engine mount to determine serviceability.	
(8)	The student relates academic skills to the requirements of **engine instrument systems**. The student is expected to:	
(A)	identify the components of engine instrument systems, including fuel flow, temperature, engine speed, pressure, torque meter, engine pressure ratio (EPR), engine indicating and crew alerting system (EICAS), and electronic centralized aircraft monitor (ECAM);	
(B)	explain the operational theory of engine instrument systems, including fuel flow, temperature, engine speed, pressure, torque meter, EPR, EICAS, and ECAM;	
(C)	describe the types of annunciator indicators and the functions of annunciator indicating systems;	

(D)	define the meaning of annunciator indicating system warning, caution, and advisory lights;	
(E)	identify the components of and explain the operational theory of full authority digital engine controls (FADEC);	
(F)	explain the purpose and methods of marking engine instrument ranges;	
(G)	research and identify the risks of damaging instrument systems or indicating systems during maintenance; and	
(H)	research and identify the risks of inaccurate engine instrument calibration or inaccurate instrument readings.	
(9)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **engine inspection**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	remove, inspect, and install a fuel-flow transmitter;	
(B)	remove, inspect, and install fuel-flow gauge;	
(C)	identify components of an electric tachometer system;	
(D)	inspect tachometer markings for accuracy;	
(E)	locate procedures for troubleshooting a turbine EPR system;	
(F)	inspect exhaust gas temperature (EGT) probes;	
(G)	locate and inspect engine low fuel pressure warning system components; and	
(H)	troubleshoot an EGT indicating system.	
(10)	The student relates academic skills to the requirements of **engine fire protection systems**. The student is expected to:	
(A)	identify types of fires such as electrical, structural, and petroleum-based fires and explain the purpose of engine fire zones;	
(B)	identify the components of and explain the basic operation of fire detection warning systems;	
(C)	explain the purpose of fire detection system maintenance and inspection requirements;	
(D)	identify fire extinguishing agents and types of systems;	
(E)	explain the purpose and methods of fire extinguishing system maintenance and inspection;	
(F)	research and identify the risks of container discharge cartridges;	

(G)	research and identify the risks of extinguishing agents; and	
(H)	research and identify the risks of maintenance on circuits associated with electrically-activated container discharge cartridges.	
(11)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **engine fire protection systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify fire detection sensing units;	
(B)	locate troubleshooting procedures for a fire detection system;	
(C)	inspect fire extinguisher discharge circuit;	
(D)	check operation of fire warning press-to-test and troubleshoot faults; and	
(E)	identify continuous-loop fire detection system components.	
(12)	The student relates academic skills to the requirements of **engine electrical systems**. The student is expected to:	
(A)	identify the components of engine electrical systems, including alternating current generators, direct current generators, alternators, starter generators, voltage regulators, overvoltage protection, and overcurrent protection;	
(B)	explain the operational theory of engine electrical systems, including alternating current generators, direct current generators, alternators, starter generators, voltage regulators, overvoltage protection, and overcurrent protection;	
(C)	explain the procedure for locating the correct electrical wire size needed to fabricate a wire;	
(D)	explain the purpose of engine electrical wiring, switches, and protective devices;	
(E)	research and identify the risks of reversing polarity when performing electrical system maintenance;	
(F)	research and identify the actions necessary in response to a warning or caution annunciator light;	
(G)	research and identify the risks of performing maintenance on energized aircraft systems; and	
(H)	research and identify the risks of improper routing and securing wiring near flammable fluid lines.	

(13)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **engine electrical systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect engine electrical wiring, switches, cable, and protective devices;	
(B)	analyze the suitability of a replacement component by part number;	
(C)	troubleshoot a direct-drive electric starter system;	
(D)	select the appropriate wire size for engine electrical system;	
(E)	repair a broken engine electrical system wire;	
(F)	troubleshoot an electrical system using a schematic or wiring diagram;	
(G)	fabricate a bonding jumper; and	
(H)	inspect engine electrical connectors.	
(14)	The student relates academic skills to the requirements of **engine lubrication systems**. The student is expected to:	
(A)	describe types, grades, and uses of engine oil;	
(B)	identify the components and explain the basic operation of lubrication systems, including wet-sumps and dry-sumps;	
(C)	explain the purpose of chip detectors;	
(D)	explain the purpose and methods of lubrication system maintenance, inspection, servicing, and analysis;	
(E)	explain the causes of excessive aircraft engine oil consumption;	
(F)	research and identify the risks of mixing engine oils;	
(G)	research and identify the risks in not using the manufacturer's recommendations regarding the use of engine lubricants; and	
(H)	research and identify the risks of improper handling, storage, and disposal of used lubricating oil.	
(15)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **engine lubrication systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect an oil cooler or oil lines;	
(B)	identify the correct type of oil for a specific engine;	

(C)	identify approved oils for different climatic temperatures;	
(D)	identify and locate procedures for obtaining oil samples;	
(E)	inspect an oil filter or screen based on industry standards;	
(F)	identify oil system components;	
(G)	replace an oil system component;	
(H)	identify oil system flow through the engine;	
(I)	troubleshoot an engine oil pressure malfunction;	
(J)	troubleshoot an engine oil temperature system; and	
(K)	identify types of metal found in an oil filter.	
(16)	The student relates academic skills to the requirements of **ignition and starting systems**. The student is expected to:	
(A)	identify the components of ignition systems, including spark plugs, shower of sparks, magnetos, impulse couplings, solid-state ignitions, FADECs;	
(B)	explain the operational theory of ignition systems and components, including spark plugs, shower of sparks, magnetos, impulse couplings, solid-state ignitions, FADECs;	
(C)	identify the components and explain the basic operation of engine starters;	
(D)	identify the components and explain the basic operation of turbine engine ignition systems;	
(E)	research and identify the risks of advanced and retarded ignition timing on piston engines;	
(F)	research and identify the risks of maintenance on engines with capacitor discharge ignition systems; and	
(G)	research and identify the risks of working around reciprocating engines with an ungrounded magneto.	
(17)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **ignition and starting systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	remove, clean, inspect, and install a spark plug;	
(B)	inspect an electrical starting system;	
(C)	troubleshoot an electrical starting system;	Discussed and it falls in line with definitions above. (Intro 6)
(D)	troubleshoot ignition switch circuit;	

(E)	identify the correct spark plugs used for replacement installation; and	
(F)	identify the correct igniter plug on a turbine engine.	
(18)	The student relates academic skills to the requirements of **engine fuel and fuel metering systems**. The student is expected to:	
(A)	explain the purpose of proper fuel to air ratios and fuel metering;	
(B)	identify the components of fuel metering systems, including float carburetor, pressure carburetor, continuous-flow fuel injection, FADEC, and hydromechanical fuel control;	
(C)	explain the basic operation of fuel metering systems, including float carburetor, pressure carburetor, continuous-flow fuel injection, FADEC, and hydromechanical fuel control;	
(D)	explain the adjustment of fuel metering systems, including float carburetor, pressure carburetor, continuous-flow fuel injection, FADEC, and hydromechanical fuel control;	
(E)	explain the purpose and basic operation of fuel heaters, lines, pumps, valves, filters, and drains;	
(F)	explain the basic operation of fuel nozzles and manifolds;	
(G)	identify the components and explain the basic operation of turbine engine fuel metering systems;	
(H)	locate and explain inspection requirements for an engine fuel system;	
(I)	explain fuel system operation;	
(J)	research and identify the risks of adjusting of turbine engine fuel controls;	
(K)	research and identify the risks of adjusting of reciprocating engine fuel controls;	
(L)	research and identify the risks of handling fuel metering system components or fuel control units that may contain fuel; and	
(M)	research and identify the risks of fuel system maintenance.	
(19)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **engine fuel and fuel metering systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	identify carburetor components;	
(B)	identify fuel and air flow through a float-type carburetor;	
(C)	remove and install a carburetor main metering jet;	
(D)	inspect the needle, seat, and float level on a float-type carburetor;	

(E)	adjust carburetor idle speed and mixture;	
(F)	research and locate procedures for a turbine engine revolutions per minute overspeed inspection;	
(G)	research and locate procedures for adjusting a hydromechanical fuel control unit;	
(H)	explain procedures for removing and installing a turbine engine fuel control unit;	
(I)	identify components of an engine fuel system;	
(J)	identify fuel selector placards;	
(K)	inspect engine fuel system fluid lines and components;	
(L)	locate the procedures for troubleshooting a turbine engine fuel heater system; and	
(M)	inspect fuel selector valve.	
(20)	The student relates academic skills to the requirements of **reciprocating engine induction and cooling systems**. The student is expected to:	
(A)	identify the components and explain the theory of operation of reciprocating engine induction and cooling systems;	
(B)	explain the causes and effects of induction system icing;	
(C)	identify the components and explain the theory of superchargers, supercharger controls, turbochargers, turbocharger controls, and intercoolers;	
(D)	identify the components and explain the theory of augmenter cooling systems;	
(E)	identify the components and explain the theory of induction system filtering and carburetor heaters;	
(F)	research and identify the risks of maintenance on turbochargers;	
(G)	research and identify the risks of ground operation of aircraft engines;	
(H)	research and identify the risks of maintenance-related FOD; and	
(I)	research and identify the risks of chemicals used in liquid cooling systems.	
(21)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **reciprocating engine induction and cooling systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	inspect a carburetor heat system;	
(B)	inspect an alternate air valve for proper operation;	

(C)	inspect an induction system drain for proper operation;		
(D)	service an induction air filter;		
(E)	inspect an induction system for obstruction;		
(F)	inspect an air intake manifold for leaks;		
(G)	locate the proper specifications for coolant used in a liquid-cooled engine;		
(H)	inspect reciprocating engine cooling ducting and baffle seals for damage;		
(I)	identify components of a turbocharger induction system;		
(J)	identify exhaust augmenter-cooled engine components;		
(K)	inspect and repair a cylinder baffle;		
(L)	inspect cowl flap system for normal operation; and		
(M)	inspect cylinder cooling fins for damage.		
(22)	The student relates academic skills to the requirements of **turbine engine air systems**. The student is expected to:		
(A)	identify the components and explain the operational theory of air cooling systems, turbine engine induction system, turbine engine bleed air system and turbine engine anti-ice system;		
(B)	explain the purpose and theory of turbine engine cowling air flow and turbine engine internal cooling;		
(C)	identify the components and purpose of turbine engine baffle and methods of seal installation;		
(D)	identify and explain the purpose of turbine engine insulation blankets and shrouds;		
(E)	research and identify the risks of maintenance on compressor bleed air systems; and		
(F)	research and identify the risks of ground operation of aircraft engines following other than manufacturer's instructions.		
(23)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **turbine engine air systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:		
(A)	identify location of turbine engine insulation blankets;		
(B)	identify turbine engine cooling air flow;		
(C)	inspect rigid or flexible turbine engine cooling ducting or baffle seals; and		

(D)	identify turbine engine ice and rain protection system components.		
(24)	The student relates academic skills to the requirements of **engine exhaust and reverser systems**. The student is expected to:		
(A)	identify the components of reciprocating engine exhaust systems, turbine engine exhaust systems, noise suppression, and thrust reversers;		
(B)	explain the operational theory of reciprocating engine exhaust systems, turbine engine exhaust systems, noise suppression, and thrust reversers;		
(C)	research and identify the risks of maintenance and inspection of exhaust system components;		
(D)	research and identify the risks of operating reciprocating engines with exhaust systems leaks and exhaust system failures; and		
(E)	research and identify the risks of ground operation of aircraft engines.		
(25)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **engine exhaust and reverser systems**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:		
(A)	identify the type of exhaust system on a particular aircraft;		
(B)	inspect exhaust system;		
(C)	locate and explain procedures for testing and troubleshooting a turbine thrust reverser system; and		
(D)	perform a pressure leak check of a reciprocating engine exhaust system.		
(26)	The student relates academic skills to the requirements of **propellers**. The student is expected to:		
(A)	explain the theory and operation of propellers;		
(B)	identify types of propellers and blade design.		
(C)	explain the theory and operation of constant speed propellers, pitch control systems, and propeller governors;		
(D)	explain the theory and operation of turbine engine propeller beta range operation.		
(E)	explain the purpose and methods of propeller servicing, maintenance, and inspections.		
(F)	identify and locate procedures for removal and installation of a propeller;		
(G)	explain the purpose of propeller TCDS;		

(H)	explain the theory and operation of propeller synchronization systems and propeller ice control systems; and	
(I)	research and identify the risks of propeller ground operation, maintenance, and inspections.	
(27)	The student uses regulatory and industry standards and demonstrates technical knowledge and skills for **propellers**, utilizing aircraft, aircraft training devices, or equivalent simulated situations. The student is expected to:	
(A)	check blade static tracking;	
(B)	inspect a propeller for condition and airworthiness;	
(C)	measure propeller blade angle;	
(D)	locate and explain the procedures for balancing a fixed-pitch propeller;	
(E)	identify propeller range of operation; and	
(F)	determine what minor propeller alterations are acceptable using the propeller specifications, TCDS, and listings.	