

STRANDS AND STANDARDS

AVIATION MAINTENANCE 1



Course Description

Aviation Maintenance 1 prepares students to demonstrate the theories, principles, skills, and risks associated with safety, aircraft drawings, maintenance forms, records, publications, an regulations, aircraft weight and balance, cleaning and corrosion control, mathematics, and fluid lines and fittings. These courses are designed to meet Federal Aviation Administration (FAA) requirements for licensing as an airframe and powerplant mechanic.

The strands and standards identified in this document align with industry through the Federal Aviation Administration (FAA) Airman Certification Standards (ACS).

Intended Grade Level	9-12
Units of Credit	0.5
Core Code	40.09.00.00.001
Concurrent Enrollment Core Code	--
Prerequisite	--
Skill Certification Test Number	--
Test Weight	--
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Aviation - Maintenance
Endorsement 2	--
Endorsement 3	--

STRAND 1

Students will understand risk management and principles of safety.

Standard 1

Understand how to properly use appropriate personal protective equipment (PPE).

- Eye protection.
- Hearing protection.
- Hand and skin protection.
- Respiratory protection and filtration (masks, etc.).
- Chemical neutralization.
- Arc Flash/Electrical safety and protection.
- Proper attire (footwear, clothing, jewelry, hair, etc.).

Standard 2

Understand the importance and use of safety data sheets (SDS).

- Read and interpret content.
- Understand purpose and content.

Standard 3

Identify and demonstrate understanding of the basic principles of hazardous materials and shop safety equipment.

- Hazardous materials (storage, labeling, handling, PPE, etc.).
- Shop safety equipment locations (fire extinguisher, eye wash, chemical cleanup, first aid kit, etc.).
- Incident and accident reporting procedures.
- Shop safety rules.

Standard 4

Describe the importance of alerts, cautions, and warnings used in maintenance and operating manuals.

- Lock out/tag out procedures.
- Basic definitions of alerts, cautions, warnings, and notes found in maintenance and operating manuals.

STRAND 2

Students will be able to read and create aircraft drawings for proposed maintenance procedures using industry standard drafting techniques.

Standard 1

Analyze the purpose, function, and version control of aircraft drawings.

Standard 2

Identify types of aircraft drawings.

- Orthographic views.
- Electrical.
- Hydraulic.
- Pneumatic Systems.

Standard 3

Explore various methods for illustrating aircraft drawings.

- Blueprints (preferred method).
- Computer-Aided Design (CAD).
- Solid works.

Standard 4

Differentiate various drafting lines and interpret their meaning.

Standard 5

Explain the importance of dimensions in aircraft drawings (clearance and tolerances)

Standard 6

Read an aircraft production drawing.

- Identify risks for specifications for design of alterations and repairs.
- Explain how aircraft drawings relate to the aircraft model and serial number.

Standard 7

Apply techniques used in sketching/drafting.

- Freehand
- Blocking
- Precision drafting

Performance Skills

- Create an aircraft drawing using symbols and system schematics.
- Investigate commonly used aircraft electrical and electronic symbols.
- Classify lines and symbols in an aircraft drawing.
- Perform an installation using diagrams and schematics to meet manufacturers specifications.
- Create sketches of repairs and alterations.
- Read, interpret, and use blueprint information.
- Read, interpret, and use aircraft drawings.
- Trace circuits with aircraft wiring diagrams.
- Identify and interpret dimensions.
- Use manufactures charts and graphs.

STRAND 3

Students will understand and perform aircraft cleaning and corrosion control.

Standard 1

Identify principles and basic theory of corrosion.

Standard 2

Investigate corrosion-prone areas.

Standard 3

Identify the types of corrosion and their detection methods.

Standard 4

List corrosion inspection, cleaning, and control procedures.

Standard 5

Demonstrate the removal and treatment of corrosion.

- Removal.
- Neutralizing.
- Corrosion preventative compounds.

Standard 6

Explore corrosion preventive maintenance procedures.

- Material selection compatibility.
- Surface coatings.
- Contamination prevention.

Performance Skills

- Select and use appropriate PPE for a given cleaning material.
- Inspect and identify aircraft corrosion, including common corrosion-prone areas.
- Apply corrosion prevention/coating materials and protective finishes.
- Clean and protect aircraft surfaces including paint, metals, plastics, and engine parts.
- Determine location and size requirements for aircraft registration numbers.
- Prepare surfaces for painting; identify and use appropriate paints, etch solutions, thinners, conversion coatings, and paint system compatibility.

STRAND 4

Students will explain the importance of weight and balance for various kinds of aircraft and make appropriate calculations.

Standard 1

Explain the importance, principles, purpose, and effect of weight and balance.

Standard 2

Define common terminology used in weight and balance procedures.

Standard 3

Investigate weighing procedures and general preparations for aircraft weighing.

Standard 4

Calculate weight and balance.

- Calculate the center of gravity (CG), arm, and moment.
- Calculate the addition and removal of equipment and ballast
- Calculate for adverse-loading conditions.

Standard 5

Identify the characteristics of helicopter weight and balance.

- Emphasize smaller CG envelope vs fixed wing.
- Differences in equipment and tools required.

Standard 6

Analyze aerodynamic effects and performance in relation to weight and balance principles.

- Pilots.
- Passengers.
- Cargo.
- Fueling loading for flight with CG.

Standard 7

Relate risks with the weight and balance of an aircraft.

- Jacking an aircraft.
- Weighing procedures.
- Use of scales and equipment.
- De-fueling an aircraft.

Performance Skills

- Weigh an aircraft in accordance with manufacture specifications and procedures (Type Certificate Data Sheet).
- Perform complete weight and balance check and record data.
- Check aircraft weighing scales for calibration.
- Identify tare items.
- Identify datum and perform calculations of the center of gravity, arm, and moment.
- Perform calculations of adding and removing equipment/ballast.
- Perform calculations to determine adverse-loading conditions.
- Compute forward and aft loaded center of gravity.
- Compute weight and balance on a helicopter.
- Examine weight and balance records.
- Calculate complete weight and balance and loading for passengers and cargo in preparation for flight.

STRAND 5

Students will explain the importance of maintenance forms, records, publications, and regulations.

Standard 1

Cite privileges and limitations of an airframe and powerplant mechanic certificate.

- Earning, losing, and re-establishing a certificate.
- Time in service.
- Maintenance.
- Preventative maintenance.
- Major alteration.
- Major repair.
- Minor alteration.
- Minor repair.
- Regulatory framework of an aircraft mechanic.
- Address change notification procedures.

Standard 2

Compile data for maintenance records.

- Return to service entries (maintenance, inspections, alterations, major overhaul, etc.).
- Documentation of inoperative equipment, discrepancy records, and placards.
- FAA forms (FAA Forms 337, 8010-4, 8100-2, 8130-3, etc.).
- Aviation/maintenance terminology, terminology resources, and awareness of acronyms (14 CFR part 1).

Standard 3

Identify and use approved publications in performance of aircraft maintenance.

- Type Certificate Data Sheet (TCDS).
- Supplemental Type Certificate (STC).
- Advisory Circulars (AC).
- Airworthiness Directives (AD).
- Alternative Method of Compliance (AMOC) for an AD.
- FAA-approved data, acceptable practices, manufacturer's publications, maintenance manuals, service bulletins, maintenance alerts, and master minimum equipment lists including inspection interval requirements.
- Identify applicability of effectivity codes in parts manuals.
- Identify methods used to establish the serial number effectivity of an item.
- Databases and on-line resources available.
- FAA-approved airworthiness limitations.
- Air Transport Association (ATA) Codes.

Standard 4

Students will identify, assess, and mitigate risks associated with maintenance forms, records, publications, and regulations.

- Importance of completeness or accuracy of documentation
- Attitude effects on recording data during documentation phase of maintenance procedures.
- Risks documented in Safety Data Sheets.
- Importance of adhering to warnings, cautions, or notes in maintenance and operational manuals.
- Importance of component applicability of an aircraft.

Performance Skills

- Compare “approved data” and “acceptable data” (required for major repair/alteration), and identify the applicability of approved data for a major repair.
- Complete an FAA Form 337 for a major repair or alteration and review the document for accuracy. For a given repair or alteration, determine if it is major or minor.
- Complete a 100-hour inspection aircraft maintenance and a maintenance record entry for return to service.
- Determine an aircraft’s inspection status from a given aircraft record.
- Determine if a given published Airworthiness Directive (AD) is applicable to the aircraft.
- Record multiple AD compliance maintenance records entries for a specific airframe, aircraft engine, appliance, or propeller.
- Perform an aircraft conformity inspection using the correct manufacturer’s aircraft equipment list, FAA aircraft specifications, and FAA TCDS.
- Assess a component for proper markings using a Technical Standard Order (TSO) or part manufacturing authorization (PMA).
- Identify a specific part number and applicability using a manufacturer’s illustrated parts catalog and determine approved replacement parts for installation on a given aircraft.
- Locate the reference sources for supplemental type certificates (STC) applicable to a specific aircraft.
- Determine the conformity of an aircraft instrument range markings, placarding, and maximum allowable weight of a specific aircraft using a type certificate data sheet (TCDS).

STRAND 6

The student will demonstrate an understanding of fluid lines and fittings

Standard 1

Students will investigate the fabrication, use, characteristics, and maintenance practices involved with fluid line hoses and tubing.

- Identify tubing and hose materials, applications, sizes, and fittings
- Describe rigid line fabrication, installation, and inspection techniques/practices.
- Identify flexible hose material and describe flexible hose fabrication, installation, and inspection techniques/practices.
- Discuss maintenance practices involving use of a torque wrench when securing fluid hose and line fittings, and the use of torque seal or similar witness techniques after installing critical fluid hose and line fittings.

Standard 2

Students will identify, assess, and mitigate risks associated with fluid lines and fittings.

- Identify the fluid system configuration prior to and during maintenance.
- Explain the use of required safety equipment and hazards associated with hydraulic fluids.
- Discuss the risks associated with high-pressure fluid systems, twisted hoses, and loosened fittings or a hose that has moved out of position.
- Improper use of tools while applying torque to a fluid line.

Performance Skills

- Identify fluid lines, pneumatic lines, and fittings.
- Fabricate a rigid line with a flare and a bend
- Fabricate a flareless-fitting-tube connection
- Install aircraft rigid line and inspect installation and security requirements.
- Install an aircraft flexible hose and inspect installation and security requirements.
- Fabricate a flexible hose.

STRAND 7

The student will demonstrate knowledge of mathematics in relation to aviation maintenance.

Standard 1

Students will apply mathematical principles to aviation maintenance problems.

- Measurement systems.
- Volumes, areas of various geometrical shapes.
- Definitions, descriptions and use of geometrical terms, including but not limited to any of the following: polygon, pi, diameter, radius, and hypotenuse.
- Ratio problems, including examples of where or how they may be used in relation to aircraft maintenance or system(s) operation.
- Proportion and percentage problems, including examples of where or how they may be used in relation to aircraft maintenance or system(s) operation.
- Algebraic operations, including examples of where or how they may be used in relation to aircraft maintenance.
- Conditions or areas in which metric conversion may be necessary.
- Scientific (exponential) notation, decimal notation, fractional notation, binary notation, and conversion between these various forms of numeric notation.
- Rounding numbers. Powers and special powers.
- Use of positive and negative integers in mathematical operations. Basic mathematic functions (addition, subtraction, multiplication, division).

Standard 2

The student will identify, assess, and mitigate risks associated with mathematical calculations in relation to aviation maintenance.

- Precedence of operations when solving an algebraic equation.
- Use of both positive and negative integers in mathematical operations.
- Rounding off calculations.

Performance Skills

- Determine the square root of given numbers.
- Compute the volume of a cylinder.
- Compute the area of a wing, the volume of a shape, such as a baggage compartment or fuel tank.
- Convert between fractional and decimal numbers, and compare two numerical values using ratios.
- Compute compression ratio of a reciprocating engine.
- Compute the torque value when converting from inch-pounds to foot-pounds or from foot-pounds to inch-pounds.

STRAND 8

Students will understand the importance of career readiness skills as it relates to participation in TSA (Technology Student Association), SkillsUSA, or any other related CTSO in aviation-related fields.

Performance Skills

The following aviation workplace skills should be discussed, taught, re-enforced, and modeled throughout the strands and standards of the course:

- Communication
- Teamwork
- Critical and Creative Thinking
- Problem Solving
- Dependability