

STRANDS AND STANDARDS

AIRCRAFT SYSTEMS



Course Description

Aircraft Systems will give students the knowledge to take and pass the FAA written exam and prepare them for flight. Some of the areas of study will include science of flight, aircraft engine systems, fueling systems, pressurization, electrical systems, hydraulic and pneumatic systems, and aircraft control systems and weight distribution.

Intended Grade Level	11-12
Units of Credit	Minimum 0.5
Core Code	40.11.00.00.042
Concurrent Enrollment Core Code	40.11.00.13.042
Prerequisite	Private Pilot
Skill Certification Test Number	N/A
Test Weight	N/A
License Type	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Commercial Aircraft Pilot
Endorsement 2	N/A
Endorsement 3	N/A



STRAND 1

Students will be able to understand the science of flight.

Standard 1

Physics involved in flight.

- General characteristics of matter
- Matter of measurement
- Fluids
- Machines
- Work, energy, and power
- Friction
- Force and motion of bodies
- Vibration
- Resonance
- Systems

Standard 2

Aircraft engine types and construction.

- The heat engine
- Comparison of aircraft power plants
- Types of reciprocation engines
- Reciprocating engine design and construction
- Engine components

Standard 3

Reciprocating engine theory of operation.

- Reciprocating gasoline engine operating principles
- Operating cycles
- Four-stroke cycle
- Engine power and efficiency
- Absolute and gauge pressure
- Efficiencies

STRAND 2

Students will be able to understand and explain aircraft engine systems.

Standard 1

Engine lubrication and cooling systems.

- Principles of engine lubrication
- Requirements and characteristics of reciprocating engine lubricants
- Internal lubrication

- System operation maintenance
- Engine cooling system
- Engine temperature control
- Thermal shock

Standard 2

Propeller and governor systems.

- Propeller principles
- Propeller operations
- Types of propellers
- Constant-speed propellers
- Governor principles
- Unfeathering
- Propeller synchronization
- Propeller ice control systems

Performance Skill

Understand and explain aircraft engine systems.

- Engine lubrication and cooling systems.
- Propeller and governor systems.

STRAND 3

Students will understand and demonstrate proper procedures in handling the aircrafts engine and interior comfort.

Standard 1

Fuels and fuel systems.

- The energy source for the combustion process
- Fuels for reciprocating engines
- Fuel metering systems
- Aircraft float carburetor
- Carburetor icing and heating
- Fuel injection systems

Standard 2

Power management.

- RPM and MAP
- Other factors affecting power
- Less MAP at altitude
- Engine operations
- “Popping” to start an engine
- Stopping procedure

Standard 3

Supercharging and turbocharging.

- Turbocharging
- Turbocompound systems for reciprocating engines

Standard 4

Pressurization and high altitude operations.

- Attitude physiology
- The atmosphere
- Respiration and circulation
- Hypoxia
- Oxygen equipment
- Hyperventilation
- Dysbarism
- Trapped gases
- Cabin pressurization and decompression
- Cabin pressurization systems

Performance Skill

Understand and demonstrate proper procedures in handling the aircrafts engine and interior comfort.

- Fuels and fuel systems.
- Power management.
- Supercharging and turbocharging.
- Pressurization and high altitude operations.

STRAND 4

Students will be able to understand and explain aircraft electrical systems.

Standard 1

Electrical principles.

- Electron flow
- Units of electrical measure
- Pressure
- Metric prefixes and powers of ten
- Static electricity
- Electromagnetic fields
- Distribution of electrical charges
- Magnetism
- Electromagnetics
- Sources of electrical energy
- Electromagnetic induction

- Mechanical power in electrical circuits
- Advantages of alternating current over direct current
- Alternating current and its generation

Standard 2

Electrical components.

- Batteries
- Battery servicing
- Generators
- Control of aircraft DC generators
- Circuit control devices
- Inverters and diodes
- Half-wave and full-wave rectifier
- Transformers

Standard 3

Aircraft electrical systems.

- Series and parallel circuits
- Voltage and current measuring instruments
- The aircraft electrical system
- Ammeters and loadmeters in the circuit
- Electrical system installation
- Ignition system
- Electrical circuit of the magneto

Performance Skill

Understand and explain aircraft electrical systems.

- Electrical principles.
- Electrical components.
- Aircraft electrical systems.

STRAND 5

Students will be able to understand and explain aircraft hydraulic and pneumatic systems.

Standard 1

Hydraulic systems and landing gear.

- History of fluid power applications
- Basic laws of fluid power
- Fluid statics and dynamics
- Hydraulic fluids
- Hydraulic system components
- Evolution of the aircraft hydraulic system
- The power pack

- Aircraft landing gear
- Nose wheel steering and shimmy dampers
- Aircraft brakes, wheels, tires and tubes

Standard 2

Pneumatic and deicing systems.

- Pneumatic systems
- Ice controls
- Rain control systems

Performance Skill

Understand and explain aircraft hydraulic and pneumatic systems.

- Hydraulic systems and landing gear.
- Pneumatic and deicing systems.

STRAND 6

Students will be able to understand and explain aircraft control systems and proper weight distribution.

Standard 1

Aircraft structures and flight controls.

- Evolution of aircraft structures
- Stresses and structure
- Materials for aircraft construction
- Flight controls
- Auxiliary lift devices
- Control systems for large aircraft

Standard 2

Weight and balance, inspections and pilot maintenance.

- Weight and balance
- Adverse-loaded center of gravity
- Balance changes after an alteration
- Aircraft inspections
- Pilot accomplished maintenance
- Maintenance forms and records

Standard 3

Aircraft instrument systems.

- Classification of instruments
- Pitot-static systems
- New types of rate gyros
- The magnetic compass
- EFIS and EICAS systems

Performance Skill

Understand and explain aircraft control systems and proper weight distribution.

- Aircraft structures and flight controls.
- Weight and balance, inspections and pilot maintenance.
- Aircraft instrument systems.

STRAND 7

Students will understand the importance of career readiness skills as it relates to the workplace and outlined in the SkillsUSA Framework – Level 2.

Standard 1

Understand and demonstrate reliability.

- Determine individual time management skills.
- Explore what's ethical in the workplace or school.
- Demonstrate awareness of government.
- Demonstrate awareness of professional organizations and trade unions.

Standard 2

Understand and demonstrate responsiveness.

- Define the customer.
- Recognize benefits of doing a community service project.
- Demonstrate social etiquette.
- Identify customer expectations.

Standard 3

Understand resiliency.

- Discover self-motivation techniques and establish short-term goals.
- Select characters of a positive image.
- Identify a mentor.

Standard 4

Understand and demonstrate workplace habits.

- Participate in a shadowing activity.
- Explore workplace ethics: codes of conduct.
- Recognize safety issues.
- Perform a skill demonstration.
- Exercise your right to know.

Standard 5

Understand and develop initiative.

- Develop personal financial skills.
- Develop a business plan.
- Investigate entrepreneurship opportunities.

Standard 6

Understand and demonstrate continuous improvement.

- Conduct a worker interview.
- Demonstrate evaluation skills.
- Examine ethics and values in the workplace.
- Develop a working relationship with a mentor.
- Construct a job search network.