

Introduction to Aerospace

| | |
|---|---|
| Primary Career Cluster: | Transportation |
| Course Contact: | CTE.Standards@tn.gov |
| Course Code(s): | C20H15 |
| Prerequisite(s): | None |
| Credit: | 1 |
| Grade Level: | 9-10 |
| Elective Focus - Graduation Requirements: | This course satisfies one of three credits required for an elective focus when taken in conjunction with other Transportation courses. |
| POS Concentrator: | This course satisfies one out of two required courses that meet the Perkins V concentrator definition, when taken in sequence in the approved program of study. |
| Programs of Study and Sequence: | This is the first course in the <i>Aviation Flight</i> program of study. |
| Aligned Student Organization(s): | SkillsUSA: http://www.skillsusatn.org/ |
| Coordinating Work-Based Learning: | Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html . |
| Promoted Tennessee Student Industry Credentials: | Credentials are aligned with postsecondary and employment opportunities and with the competencies and skills that students acquire through their selected program of study. For a listing of promoted student industry credentials, visit https://www.tn.gov/education/educators/career-and-technical-education/student-industry-certification.html . |
| Teacher Endorsement(s): | 512, 579, 594, 773, 774, 782 |
| Required Teacher Certifications/Training: | FAA Industry Certification |
| Teacher Resources: | https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-transportation-distribution-logistics.html Best for All Central: https://bestforall.tnedu.gov/ |

Course at a Glance

CTE courses provide students with an opportunity to develop specific academic, technical, and 21st century skills necessary to be successful in career and in life. In pursuit of ensuring every student in Tennessee achieves this level of success, we begin with rigorous course standards which feed into intentionally designed programs of study.

Students engage in industry relevant content through general education integration and experiences such as Career and Technical Student Organizations (CTSO) and work-based learning (WBL). Through these experiences, students are immersed with industry standard content and technology, solve industry-based problems, meaningfully interact with industry professionals and use/produce industry specific, informational texts.

Using a Career and Technical Student Organization (CTSO) in Your Classroom

CTSOs are a great resource to put classroom learning into real-life experiences for your students through classroom, regional, state, and national competitions, and leadership opportunities. Below are CTSO connections for this course, note this is not an exhaustive list.

- Participate in CTSO Fall Leadership Conference to engage with peers by demonstrating logical thought processes and developing industry specific skills that involve teamwork and project management.
- Participate in contests that highlight job skill demonstration. These include Career Pathways Showcase, Job Interview, Commercial sUAS Drone, and Aviation Maintenance Technology.

Using a Work-Based Learning (WBL) in Your Classroom

Sustained and coordinated activities that relate to the course content are the key to successful work-based learning. Possible activities for this course include the following. This is not an exhaustive list.

- **Standards 1.1** | Include a safety briefing in a visit to an airport.
- **Standards 2.1** | Have a pilot and maintenance technician visit the class to talk about careers.
- **Standard 3.1** | Have an older pilot or maintenance technician visit the class to talk about some of their aviation experiences.
- **Standards 4.1 – 4.3** | Visit an airfield and ask a pilot to give an overview of their aircraft.
- **Standards 5.1 -5.4** | Ask a pilot to discuss flight environments and situations they have experienced.

Course Description

Introduction to Aerospace is a comprehensive foundational course for students interested in pursuing careers in aviation. This course covers the basic principles governing flight and the regulation of flight that every aviation professional must know regardless of his or her occupation—as a pilot or an engineer, a salesperson or a specialist, a mechanic or a statistician. In addition to acquiring foundational knowledge of safety procedures and industry regulations, students will also gain essential understanding of aircraft structures, the flight environment, basic procedures, and navigation. Upon completion of this course, proficient students will be prepared for further study in advanced *Aviation Flight* and/or *Aviation Maintenance* courses.

Course Standards

1. Aviation Safety

- 1.1 Safety: The number one priority of aviation personnel is to maintain the **safety of flight**. Identify the **basic safety issues** that a pilot must be aware of before, during, and after each flight, including but not limited to: pilot's mental and physical condition, collision avoidance, weather conditions, maintaining minimum safe altitudes, visual scanning, right of way rules, flight over hazardous terrain, positive exchange of flight controls, operating within the aircraft's approved weight and balance, and airspeed limitations.

2. Career Opportunities in Aviation

- 2.1 Career Options: Summarize the wide range of **career pathways** available in aviation today. Careers may include, but are not limited to: pilots, airframe and powerplant mechanics (A&P), aeromechanical engineers, airport operators, airline statisticians, Air Traffic Controllers (ATC), Flight Service Specialists (FSS), aircraft manufacturing, and aircraft sales. Explain the essential **knowledge and skills** required for careers in aviation. Describe important **aptitudes for success** in these careers, such as mechanical, verbal, scientific, manipulative, numerical, administrative, social, and artistic.
- 2.2 Organizations: Investigate **regulatory agencies, governing bodies, and professional organizations** related to the aviation industry, such as the Federal Aviation Administration (FAA), National Transportation Safety Board (NTSB), and National Aeronautics and Space Administration (NASA). Explain their functions, jurisdictions, and importance within the industry.

3. History of Aviation

- 3.1 History: Understand the timeline of **historical milestones in the development of flight**. Describe the major obstacles that were overcome to achieve controlled, sustained, and powered heavier-than-air flight. Identify **major contributors** to the field of aviation, including scientists, inventors, pilots, and other historical figures, and determine what each person contributed. Discuss their impact on both the development of flight as well as the industry as a whole.

4. Aircraft Structures and Systems

- 4.1 Major Components: Identify the 5 major parts of an Airplane and understand the purpose of each major components. The major components are the **Fuselage, Empennage, Wings, Landing Gear and Powerplant**. Landing Gear knowledge should include Conventional (Tail Wheel) and Tricycle types and Fixed and Retractable configurations. Powerplant knowledge should include Reciprocating, Turbo Prop, Turbo Jet, and electric engine terminology and theory. Propeller knowledge should include operating theory for Fixed and Constant Speed Propellers and propellers made of composite material.
- 4.2 Systems: Identify and understand the **purpose of the Aircraft Systems and how they interact** with each other. The Aircraft Systems include the Fuel, Electrical, Ignition, Exhaust, Engine Instruments, Comm/Nav and Flight Instruments.
- 4.3 Flight and Stability: Identify and understand the purpose of the **Primary and Secondary Flight Control Surfaces and the Three Axis of Flight and Basic Aircraft Stability**.

5. Flight Environment

- 5.1 Aircraft Airworthiness: Understand and explain **basic operation of the following phases of flight**:
- basic aerodynamics,
 - preflight,
 - postflight,
 - weight and balance,
 - fuel requirements,
 - wake turbulence, and
 - collision avoidance.
- 5.2 Airport Operations: Understand **Air Traffic Control (ATC) procedures related to Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) operations**. Explain the circumstances and conditions of operation regarding:
- airport operations, and
 - local area procedures.
- 5.2 Airspace: Understanding the characteristics regarding the two basic types of **airspace**:
- controlled, and
 - uncontrolled.
- 5.4 Weather: Explain the importance of **meteorological knowledge regarding visual and instrument flight** and become familiar with key concepts and terminology for the following:
- basic weather theory,
 - VFR Minimums, and
 - IFR Minimums.

6. Basic Navigation

6.1 Navigation: Explain how basic **Pilotage and Dead Reckoning (DR) techniques** work and recognize when they are appropriate. Describe how pilots use such techniques in order to fly from one point or location to another.

7. Judgment Training

7.1 Judgment: Summarize techniques for improving **pilot judgment and decision-making skills**. Develop an original mock scenario in which a pilot must react to an in-flight complication or malfunction. Explain a strategy for remaining calm under pressure, maintaining lines of communication, and making sound decisions.

Standards Alignment Notes

*References to other standards include:

- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
 - o Note: While not all standards are specifically aligned, teachers will find the framework helpful for setting expectations for student behavior in their classroom and practicing specific career readiness skills.