



# Aviation II: Advanced Flight

<b>Primary Career Cluster:</b>	Transportation
<b>Course Contact:</b>	<a href="mailto:CTE.Standards@tn.gov">CTE.Standards@tn.gov</a>
<b>Course Code(s):</b>	C20H18
<b>Prerequisite(s):</b>	<i>Aviation I: Principles of Flight</i> (C20H16)
<b>Credit:</b>	1
<b>Grade Level:</b>	11-12
<b>Elective Focus - Graduation Requirements:</b>	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Transportation courses.
<b>POS Concentrator:</b>	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.
<b>Programs of Study and Sequence:</b>	This is the third course in the <i>Aviation Flight</i> program of study.
<b>Aligned Student Organization(s):</b>	SkillsUSA: <a href="http://www.skillsusatn.org/">http://www.skillsusatn.org/</a>
<b>Coordinating Work-Based Learning:</b>	Teachers are encouraged to use embedded WBL activities such as informational interviewing, job shadowing, and career mentoring. For information, visit <a href="https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html">https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html</a> .
<b>Promoted Tennessee Student Industry Credentials:</b>	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 <a href="https://www.tn.gov/education/educators/career-and-technical-education/student-industry-certification.html">https://www.tn.gov/education/educators/career-and-technical-education/student-industry-certification.html</a> .
<b>Teacher Endorsement(s):</b>	594, 774
<b>Required Teacher Certifications/Training:</b>	FAA Industry Certification
<b>Teacher Resources:</b>	<a href="https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-transportation-distribution-logistics.html">https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-transportation-distribution-logistics.html</a>  Best for All Central: <a href="https://bestforall.tnedu.gov/">https://bestforall.tnedu.gov/</a>

## 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 1.1-1.2** | Have a pilot discuss aerodynamics with the students.
- **Standard 2.1-2.3** | Have a pilot and maintenance technician visit the class to talk about airplanes.
- **Standards 3.1-3.4** | Have a pilot discuss airports and airspace with the students.
- **Standards 5.1-11.2** | Ask a pilot to discuss situations they have experienced. If possible, have the students fly in an airplane to enhance the experience.

## Course Description

*Aviation II: Advanced Flight* is the capstone course in the *Aviation Flight* program of study intended to prepare students for careers in aviation. While continuing to build upon the knowledge, skills, and competencies acquired in *Introduction to Aerospace* and *Aviation I*, students in *Aviation II* will receive rigorous instruction in preparation to take the Federal Aviation Administration (FAA) Private Pilot written exam. This course goes beyond the mastery of procedures under normal conditions learned in *Aviation I: Principles of Flight* and introduces students to the troubleshooting and diagnostic techniques used by pilots and other aircraft personnel to assess and correct for malfunctions, make adjustments in hazardous weather conditions, and perform other crucial emergency procedures. Continued emphasis is placed on maintaining the safety of flight and developing sound judgment (“judgment training”) throughout these conditions.

In addition, students will develop a keen understanding of advanced aerodynamics and the physics of flight to aid in decision-making and technical adjustments while working under simulated abnormal procedures. Finally, upon graduation, proficient students will be better prepared to begin flight training in pursuit of a private pilot’s license should they choose.

Flight simulators are required in order to fully master many of the standards in this course. Instructors may use a range of equipment to meet this requirement, from simple computer software such as Microsoft Flight SimX to advanced freestanding simulators such as the Redbird FMX. This course also draws on preparation materials for the FAA Private Pilot Ground Test.

## Course Standards

### 1. Airplanes and Aerodynamics

- 1.1 Aerodynamics: Demonstrate a thorough understanding of the **aerodynamic forces** that are enacted on an airplane at various phases of flight. Explain why the airplane reacts to aerodynamic forces during stalls, wingtip vortices and wake turbulence.
- 1.2 Stalls: Explain the situation and characteristics leading up to a **stall, the various types of stalls, and stall recovery techniques**. Demonstrate using a simulator (as available). Explain what do during a spin and how to recover safely from a spin.

### 2. Airplane Instruments, Engines, and Systems

- 2.1 Instruments and Systems: Explain the **airplane instruments and systems** including: pitot static, vacuum, electric, fuel and hydraulic systems. Demonstrate using a simulator (as available).
- 2.2 Engines: Explain **engine operation, leaning techniques and troubleshooting** for failed instruments/engine(s).
- 2.3 Engine Failure: Explain proper use of checklist items for **engine failure** in flight at altitude as well as at various phases of flight. Demonstrate using a simulator (as available).

### 3. Airports, Air Traffic Control, and Airspace

- 3.1 Airports: Demonstrate full understanding of **towered and non-towered airports**, lighting, markings, signage, taxiways, runways, airport diagrams, characteristics, and frequencies.

- 3.2 Airspace: Explain and identify **all classes of airspace** on an aeronautical chart including cloud clearance and visibility requirements for flight in VFR conditions.
- 3.3 Special Use Airspace: Explain and identify the various types of **special use airspace** on an aeronautical chart.
- 3.4 Air Traffic Control: Demonstrate how to correctly exchange **dialogue with Ground, Tower, and Enroute Controllers** using proper aviation phraseology.

## 4. Federal Aviation Regulations

- 4.1 Federal Aviation Regulations: Explain the rules in **FAR Part 61 (Certification for Pilots) and FAR Part 91 (General Operating and Flight Rules)**. Students should be familiar with the FARs with respect to their role as student pilot and future holders of a Private Pilot Certificate. Identify additional certificates and ratings beyond the Private Pilot Certificate.

## 5. Airplane Performance and Weight and Balance

- 5.1 Performance and Weight and Balance: Calculate various **performance and weight and balance** scenarios using the Pilot's Operating Handbook for a given aircraft along with an E6B, rotary or electronic E6B (Sporty's). *Note...a phone with an E6B app will not be allowed in the testing room for the FAA Private Pilot Knowledge Exam. Specific real world scenarios and accidents will be discussed.*

## 6. Private Pilot Maneuvers

- 6.1 Maneuvers: Discuss the **Airman Certification Standards** and how each maneuver is to be performed within acceptable limits. *This topic is largely dependent on access to a Flight Training Device (simulator).* Using a simulator, **fly demonstrating climbs, straight and level, and turns**. Depending on instructor knowledge, timing and simulator availability, students may practice the maneuvers required on the Private Pilot Practical Test.

## 7. Aeromedical Factors and Aeronautical Decision-Making

- 7.1 Aeronautical Decision-Making: Recognize the symptoms and explain how to react properly to **aeromedical factors** affecting a pilot. Includes, but not limited to effects of changes in air pressure, ear and sinus blockage, toothaches, stress, fatigue, noise, alcohol/drugs, hypoxia, hyperventilation, spatial disorientation, vision issues, and carbon monoxide poisoning. Perform a preflight self-inspection and determine airworthiness. Discuss **aeronautical decision-making** in real world scenarios using accident data.

## 8. Weather

- 8.1 Weather Impact: Explain all necessary Private Pilot Knowledge **weather topics** including reports, forecasts, charts and graphs. Discuss the explicit **dangers, causes, and effects** of thunderstorms; discuss airframe and carburetor icing; mountain waves; wind shear; and temperature/dew point. Describe the factors involved in the formation and dissipation of fog, temperature inversions, and clouds. Apply mathematics concepts to determine the stability or instability of an air mass. Explain the "go"/no go" decision that must be made when examining weather as well as personal minimums vs legal minimums.

8.2 Weather Sources: Explain the various ways to utilize **aviation weather services** during preflight and inflight. Demonstrate a call to an actual weather briefer. (800-WX-BRIEF). Demonstrate different ways to obtain a weather briefing while on the ground (phone call to FSS, internet, and Aviation Apps). Explain what a pilot should do to get an updated weather briefing while airborne (FSS, ATC, and Aviation Apps). Analyze **weather sources**, synthesize the information found, and demonstrate the ability to retrieve the correct information in a timely fashion to aid in aviation decision making. Use the following sources: METARs, TAFs, Weather Depiction Charts, Radar Summary Charts and Radar Weather Reports, Wind and Temperature Aloft Forecasts (FB), Significant Weather Prognostic Charts, AIRMETs and SIGMETs.

## 9. Navigation, Charts, and Publications

9.1 Navigation: Demonstrate correct knowledge for various forms of **navigation**. Determine correct latitude/longitude on/from a chart, convert local time to and from Zulu time, and be familiar with the various **charts and publications** available from the FAA.

9.2 Pilotage: Explain **pilotage, dead reckoning, VOR and GPS usage and operation**. Demonstrate using a simulator (as available).

## 10. Cross-Country Flight Planning

10.1 Cross-Country Planning: Create a successful and complete NavLog for a **cross-country flight**. Demonstrate using a simulator (as available). Demonstrate how to handle a diversion to a different airport.

10.2 Flight Planning Tools: Describe and identify the differences between **Clearance Delivery, Ground Controls, Towers, Approach/Departure Controls, Terminal Radar Programs, Air Route Traffic Centers (ARTC), and Flight Service Stations (FSS)**.

## 11. Emergencies

11.1 Inflight Emergency: Explain how to handle an **emergency while in flight**. Demonstrate successful use of memory items and appropriate emergency checklists for various phases of flight. Demonstrate using a simulator (as available).

11.2 Pilot Judgment and Decision-Making: Demonstrate understanding of proper techniques for improving **pilot judgment and decision-making** skills in every aspect of the pre-flight, in-flight, and post-flight stages.

## 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.