

Unmanned Aircraft Systems Pilot

Primary Career Cluster:	Transportation
Course Contact:	CTE.Standards@tn.gov
Course Code(s):	C20H29
Prerequisite(s):	None
Credit:	1
Grade Level:	11 or 12
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 a level 3 or 4 course in the <i>Aviation Flight</i> program of study.
Aligned Student Organization(s):	SkillsUSA: https://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/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/career-and-technical-education/student-industry-certification.html
Teacher Endorsement(s):	512, 579, 594, 773, 774
Required Teacher Certifications/ Training:	FAA Remote Pilot Certification (Part 107)
Teacher Resources:	https://www.tn.gov/education/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 & 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 (WB) 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.

- **Standard 1** | Have a commercial drone pilot discuss career opportunities.
- **Standards 2-19** | Have an active drone pilot discuss the realities of flying drones in various conditions.
- **Standards 20-22** | Visit an airfield and discuss drones with the operations manager.
- **Standards 23-25** | Visit a commercial drone pilot while they are conducting a mission.

Course Description

Unmanned Aircraft Systems Pilot is a course intended to prepare students for positions as commercial drone pilots for small Unmanned Aircraft Systems (sUAS). The course teaches students the knowledge and skills needed to successfully pilot sUAS (less than 55 lbs.). Students in *Unmanned Aircraft Systems Pilot* will receive rigorous instruction in preparation to take the Federal Aviation Administration (FAA) Remote Pilot Certification (Part 107) written exam also called the aeronautical knowledge exam. The course places an emphasis on applicable regulations, operating requirements, weather impacts, charts, aeronautical decision-making, and safety.

Program of Study Application

The Aviation program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for jobs in a variety of Aviation careers. Focus is on private pilot license. This course adds the drone (Part 107) commercial pilot license to the program. The specific requirements to earn a Part 107 license are: pass the initial aeronautical knowledge exam (the reason for this course), be at least 16 years old, be able to read, speak, write and understand English, and be in a physical and mental condition to safely fly a drone.

Course Standards

Careers

- 1) Use job postings, websites, and journals to identify and describe essential knowledge and skills for jobs within the small Unmanned Aircraft Systems (sUAS) field. Compose an informative table or chart that includes current sUAS jobs, job locations, salaries, upcoming career shifts related to sUAS technology, and how sUAS positions relate to other aviation positions.

Flight Operations, Performance, and Weather

- 2) Summarize the following performance topics in a written, oral, or digital presentation exhibiting a thorough understanding of small Unmanned Aircraft Systems (sUAS):
 - a. Function of flight controllers
 - b. Types of control
 - c. Performance and efficiency related to sUAS operations
 - d. Propulsion and power
 - e. Operating limits
- 3) Explain the responsibility and authority of the pilot in command (PIC) for a small Unmanned Aircraft Systems (sUAS) mission. Either in a role play or during an actual mission, demonstrate the PIC responsibilities for each step of a flight (pre-flight, normal in-flight, abnormal in-flight, emergency in-flight, and post flight).
- 4) Evaluate weather reports from various sources, including METAR and Terminal Aerodrome Forecasts, to interpret projected weather conditions for operating small

Unmanned Aircraft Systems (sUAS). Produce a chart or graphic that differentiates various weather condition impacts on sUAS operations.

Operating Requirements & Loading

- 5) Demonstrate flight planning skills by developing and comparing three different flight plan options for one mission. Write an explanation and justify which flight plan option is best to include safety, airport operations, Federal Aviation Authority regulations, weather, aircraft performance, and mission success.
- 6) Use a written or oral format to examine the operating requirements of a small Unmanned Aircraft Systems (sUAS) that includes:
 - a. Identifying and differentiating levels of unmanned aerial system autonomy
 - b. Identifying Ground Control Station and explaining its purpose
 - c. Explaining operations over human beings
 - d. Explaining requirements when a visual observer is used
 - e. Explaining how to operate from a moving aircraft or moving land or waterborne vehicle
 - f. Identifying aircraft safety of flight principles and describing the basic rules of safe operations
 - g. Evaluating the requirements for the sUAS to be in a condition for safe operation
 - h. Demonstrating an understanding of hazardous operations
- 7) Evaluate the impact of loading on the performance of small Unmanned Aircraft Systems (sUAS). Compose an informative table or chart that includes:
 - a. Payload as it applies to sUAS
 - b. Historical payload uses
 - c. Factors to consider when designing payloads
 - d. Purpose and use of various camera systems
 - e. Prohibitions for carrying hazardous material
- 8) Assess the impact of different small Unmanned Aircraft Systems (sUAS) platforms on varying missions. For example, given specific missions explain which sUAS platform, including software, would be most successful for each mission.

Aeronautical Decision-Making

- 9) Using a written or oral presentation, explain the fundamentals and principles of flight as they relate to small Unmanned Aircraft Systems. Include aeronautical principles, aerodynamics, lift, drag, thrust, weight, acceleration, objects in motion through the air, and the forces that produce change to such motions.
- 10) Interpret sectional charts, aeronautical charts and chart supplements. For example, calculate the correct answers to given specific chart reading questions which include: latitude, longitude, obstacles, navigation routes, the meaning of symbols, key terms, and the technical context of other specific words related to small Unmanned Aircraft

Systems. Examples include ICAO Location Indicator, Warning Areas, Outer Boundaries, and Transfer (TFR) Sites.

Safety & Emergency Procedures

- 11) Interpret safety rules related to operating and using small Unmanned Aircraft Systems (sUAS), completing a safety test with 100% accuracy. While preparing and flying a mission, demonstrate safe operations with the sUAS aircraft, tools and equipment. Practice the appropriate attitudes and behaviors associated with the safe handling and operation of sUAS. For example, have the students role play good and bad safety practices and attitudes.
- 12) Recognize hazards related to avoiding birds and wildlife while operating the small Unmanned Aircraft Systems (sUAS). In a report or presentation, explain requirements to report collisions between sUAS and animals.
- 13) Employ appropriate emergency procedures. For example, during a presentation, demonstrate or explain reporting requirements for in-flight emergencies and appropriate action during loss of aircraft control link and fly-aways.

Regulations, Airspace Classification, and Flight Restrictions

- 14) Using various sources, research and demonstrate an understanding of Federal Aviation Authority regulations including registration requirements, categories of vehicles, system operators, ramifications of false reporting, accident reporting, and prohibition of operating multiple small Unmanned Aircraft Systems.
- 15) Classify airspace, including general, special, and other airspace. Identify where a small Unmanned Aircraft Systems can and cannot be flown. Describe the operating requirements in certain airspaces including restrictions due to NOTAM (Notice to Airmen), prior authorization requirements, and prohibited and restricted airspace. For example, create an airspace classification chart that includes restrictions and requirements for each airspace classification.
- 16) In teams, assess various methods to prevent accidental flight into restricted spaces. For example, given a specific region and using researched sources of information, create a geo-fence around unauthorized areas. Establish this "virtual barrier" to send a text message, email alert, or app notification when the Unmanned Aircraft System enters (or exits) the specified area.

Crew Resource Management & Effects of Drugs and Alcohol

- 17) In a paper or presentation, explain crew resource management to include identifying the medical conditions that would interfere with safe operations of a small Unmanned Aircraft Systems, factors affecting vision, and fitness for flight.

- 18) Analyze the human factors related to safe aircraft operations in a written or oral presentation. Paper or presentation should include the prohibition of use of drugs and alcohol, the impact of drugs and alcohol including physiological effects of drugs and alcohol, and the consequences of refusing to submit to a drug or alcohol test or to furnish results.
- 19) Simulate a full small Unmanned Aircraft Systems crew during an operational flight employing aviation terminology and technical vocabulary. For example, in a team exercise assign students as members of a crew.

Airport Operations & Radio Communication Procedures

- 20) Identify the impacts small Unmanned Aircraft Systems (sUAS) have on airports. For example, create a chart or graphic to explain how to manage the impact a sUAS may have on airport operations including:
 - a. Distance from other aircraft
 - b. Right-of-way rules
 - c. How to operate in vicinity of airports
 - d. Airport procedures
 - e. Airport environment
 - f. Operation with and without control towers
- 21) Using a radio or simulated set up, in an oral presentation demonstrate effective communication skills while using proper radio communications procedures including Zulu time and the phonetic alphabet.
- 22) In a written or oral presentation demonstrate knowledge of aircraft communication equipment including the various transmitters.

Maintenance & Preflight Inspection Procedures

- 23) Explain, inspect and use equipment and tools related to small Unmanned Aircraft Systems. For example, set up a series of stations with the equipment and tools that can be videoed by students to be reviewed later to ensure students inspected and used the tools properly.
- 24) Troubleshoot and maintain a small Unmanned Aircraft Systems (sUAS) prior to a mission. Using the Federal Aviation Authority preflight checklist, conduct maintenance and preflight inspection procedures on a sUAS aircraft. For example, set up problems to be discovered in a sUAS to include identifying who may perform maintenance on a sUAS.

Flight

- 25) Plan and execute three sUAS missions using small Unmanned Aircraft Systems (sUAS) while serving as pilot in command. Each mission will include:
 - a. Creating an autonomous flight plan that is safe and fully complies with Federal Aviation Authority regulations within the National Airspace

- b. Completing the planned objective
- c. Demonstrating mission planning, preparation, execution, and the post flight debrief
- d. Maintaining safe operating procedures
- e. Demonstrating situational awareness
- f. Performing risk mitigation
- g. Practicing standards of professionalism

Standards Alignment Notes

*References to other standards include:

- P21: Partnership for 21st Century Skills [Framework for 21st Century Learning](#)
 - 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.