Department of Education | College, Career and Technical Education

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Unmanned Aircraft Systems in Law Enforcement

Primary Career Cluster:	Law, Public Safety, Corrections, and Security
Course Contact:	CTE.Standards@tn.gov
Course Code(s):	C30H18
Prerequisite(s):	Criminal Justice I (C30H00) and Criminal Justice II (C30H01)
Credit:	1
Grade Level:	11, 12
Elective Focus - Graduation Requirements:	This course satisfies one of three credits required for an elective focus when taken in conjunction with other Law, Public Safety, Corrections, and Security courses.
POS Concentrator	This course satisfies one out of two required courses to meet the Perkins V concentrator definition, when taken in sequence in the approved program of study.
Programs of Study and Sequence:	This is the optional third course within the *Criminal Justice and Corrections Services* 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/content/tn/education/career-andtechnical-education/work-based-learning.html
Promoted Tennessee Student Industry Credential:	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):	590, 750
Required Teacher Certifications/Training:	FAA Remote Pilot Certification (Part 107)
Teacher Resources:	https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-law-public-safety.html Best for All Central: https://bestforall.tnedu.gov/

Approved November 6, 2020

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; interviewing skills; community service activities, extemporaneous speaking, job interview, and Commercial sUAS Drone Demonstration.
- Participate in leadership activities such as Student2Student Mentoring, National Week of Service, Officer Training, and Community Action Project

For more ideas and information, visit Tennessee SkillsUSA at https://www.skillsusatn.org/.

Using Work-based Learning 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 1-5**| Invite a drone pilot from the local law enforcement agency to discuss career opportunities and safety.
- **Standards 6-11**| Virtually work with an FAA representative to classify local airspace and outline operating requirements.
- **Standards 12-16** | In teams, work with an air traffic controller to plan an sUAS mission that fully complies with FAA regulations.
- **Standards 17-22**| Invite a drone pilot from the local law enforcement agency to practice delivering payloads directly to a given location.

For more ideas and information, visit https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.

Course Description

The *Unmanned Aircraft Systems (UAS) in Law Enforcement* course is an advanced course in *Law, Public Safety, Corrections, and Security* career cluster intended to meet the needs of specific applications of advanced UAS precision technologies specific to the law enforcement industry. Students will receive rigorous instruction in preparation to take the the Federal Aviation Administration (FAA) remote Pilot Certification (Part 107) (less than 55 pounds) exam for the commercial drone pilots for small Unmanned Aircraft Systems (sUAS) and develop specific knowledge and skills associated with specific sUAS technologies, platforms and precision attachments to monitor, map, and provide data and surveillance in law enforcement situations.

Program of Study Application

This course is an optional fourth course in either the *Law, Public Safety, Corrections, and Security* career cluster. This course includes the drone (Part 107) commercial pilot license and students must be at least 16 years old to take the Part 107 exam. For more information on the benefits and requirements of implementing this program in full, please visit the *Law, Public Safety, Corrections, and Security* website at https://www.tn.gov/education/educators/career-and-technical-education/career-clusters/cte-cluster-law-public-safety.html

Course Standards

Safety

1) Accurately read and interpret safety rules related to operating and using small Unmanned Aircraft Systems (sUAS) and attachments. Demonstrate safe operation procedures with appropriate attitudes and behaviors associated with operating sUAS. Complete safety test with 100 percent accuracy.

UAS Industry and Occupational Awareness

2) Research and summarize the origins, development, and evolution of commercial small Unmanned Aircraft Systems (sUAS) operations citing primary sources, state and federal laws and regulations, and secondary sources, industry publications. Construct a group presentation explaining the important systems, people, and technologies in the development of the sUAS industry in addition to the following:
    a. limitations and constraints placed on the development of commercial sUAS,
    b. evolution of sUAS regulatory framework and process, technologies that led to modern day sUAS,
    c. important events leading to the development of sUAS,
    d. classification schemes of sUAS, and
    e. intelligence modes of control for sUAS.

3) Gather relevant information from multiple sources in both print and digital formats related to career opportunities using small Unmanned Aircraft Systems (sUAS) technology, including but not limited to current careers, upcoming career shifts related to sUAS technology, and how sUAS positions are related to the agriculture industry. Research notable historical figures, time periods, technological advancements and/or practices to develop a visual, oral, and/or written presentation that cites specific textual evidence to support analysis.

4) Compare and contrast the types and functions of precision and advanced technologies (such as GIS, GPS, and unmanned aircraft systems) available to the agriculture industry. Citing technical data and academic research, compare in a written or oral format the legal, ethical, and economic impact of using emerging technologies to improve efficiency and efficacy in the agricultural industry.

Airspace Classification and Operating Requirements

5) Analyze small Unmanned Aircraft Systems (sUAS) technologies, platforms, and systems to determine capabilities and limitations such as payload elements, stabilization & navigation sensors, environmental operation conditions, life & operational cycles, and operational considerations. Using the information gathered, create a sUAS operational presentation.

6) Synthesize information from credible sources, use a graphic organizer to create an outline of the operating requirements of a small Unmanned Aircraft Systems (sUAS) including:
    a. differentiation of the different autonomy levels of sUAS,
    b. identify and explain the purpose of a ground control station,
    c. operation regulations over human beings,
    d. requirements of a visual observer,
    e. basic rules of safe operation,
    f. aircraft safety of flight principles,
    g. requirements for the sUAS to be in a condition for safe operation, and
    h. hazardous operations plan.

7) Summarize and demonstrate the FAA regulations associated with the operation of small Unmanned Aircraft Systems (sUAS) including registration requirements, categories of vehicles, system operators, ramifications of false reporting, accident reporting, and prohibition of operating multiple small UAS.

8) Classify airspace, including general, special, and other airspaces. Describe the operating requirements in airspaces including restrictions due to Notice to Airmen (NOTAM). Given a specific region on aeronautical maps and using researched sources of information, identify authorizations required, maximum altitudes, unauthorized areas, and other points of risk or concerns for the sUAS operator.

9) Analyze the fundamentals and principles of flight to produce a written or oral presentation relating to small Unmanned Aircraft Systems (sUAS). The presentation should include but not limited to aeronautical principles, aerodynamics, objects in motion through the air, and the forces that produce change to such motions. Include responsibility and authority of Pilot in Charge (PIC.)

10) Read and interpret sectional charts, aeronautical charts, and chart supplements. Identify classifications of airspace, latitude, longitude, obstacles, and navigation routes. Include

the meaning of symbols, key terms, and other specific words related to small Unmanned Aircraft Systems (sUAS) as they are used in technical context.

11) Demonstrate effective communication skills while using proper radio communications procedures including Zulu time and the phonetic alphabet. Explain the various transmitters. Demonstrate knowledge of aircraft communication equipment.

Performance, Weather, and Restrictions

12) Compare the differences of in human factors related to the operational control, ground control, and personnel required to operate small Unmanned Aircraft Systems (sUAS.) Summarize how the different types of human actions and automatic sensory factors impact the different types of human operator errors.

13) Articulate the components of preflight planning to access risk. Be prepared to outline the risk assessment, a maintenance schedule, and conduct a preflight inspection.

14) Investigate and compare the various small Unmanned Aircraft Systems, cameras, and sensoring systems to make recommendations for specific agricultural applications.

15) Using Aviation weather reports (METAR), Terminal Aerodrome Forecasts (TAF), and other weather reports from various sources, analyze weather reports to interpret weather conditions for operating a small Unmanned Aircraft Systems (sUAS).

16) Using small Unmanned Aircraft Systems (sUAS), plan and implement a sUAS mission. The mission will include creating an autonomous flight plan that is safe, fully complies with FAA regulations within the National Airspace, and completes the planned objective. Serve as remote Pilot In Charge (PIC) for the mission. Demonstrate situational awareness and perform risk mitigation during the flights. Demonstrate standards of professionalism during flights. Demonstrate an understanding of mission planning, preparation, execution, and post-flight debrief.

Payload, Stressors, and Data Collection

17) Explain the processes of loading and payload as it applies to small Unmanned Aircraft Systems (sUAS) including the historical payload uses and prohibitions for carrying hazardous materials, citing technical manuals. Determine the impact of a load on performance by calculating the in-flight weight of the payload using load factor charts to maintain specific altitudes.

18) Summarize the legal guidelines surrounding evidence obtained by a small Unmanned Aircraft System (sUAS) in the following situations:
    a. Unlawfully captured images
    b. Crime scene documentation
    c. Search and rescue
    d. Surveillance/reconnaissance

19) Describe how small Unmanned Aircraft Systems (sUAS) are used to document scene evidence. Explain or demonstrate the creation of either an ortho-mosaic 2D diagram or 3D point cloud reconstruction with obtained photographs. Include the following concepts:
    a. Ground control points
    b. Total Station or Real Time Kinematics GPS
    c. Photogrammetry

20) Use the sUAS with either a single or multiple camera sensor setup to aid in aerial search and rescue operations. Using GPS, document the previously searched areas and identify areas for future searches. Explain the following:
    a. Using encrypted video transmission equipment to distribute the live video feed securely and remotely to others.
    b. Using advanced mission planning software to orchestrate the integration of sUAS with ground personnel.
    c. Using the sUAS with a payload release mechanism for delivery of first aid supplies, water, personal flotation devices, etc. directly to the injured.

21) Explain the use of the sUAS for aerial support of SWAT or tactical response teams using thermal or infrared camera sensors and encrypted video transmission equipment. Include a description of the distribution of the live video feed securely and remotely to team personnel and the command post.

22) Evaluate the use of the sUAS in the following scenarios:
    a. To monitor prior to and during the execution of a high risk warrant
    b. To monitor protests, crowds at outdoor venues/concerts, etc.
    c. To monitor vehicle and pedestrian traffic
    d. To detect chemical, biological, and/or radiological signatures at HAZMAT scene using sensors

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.
- Work-Based Learning Framework opportunities (such as internships, cooperative education, service learning, and job shadowing) or industry-driven project based learning. These experiences must comply with the Work-Based Learning Framework guidelines established in SBE High School Policy 2.103. As such, this course must be taught by a teacher with an active WBL Certificate issued by the Tennessee Department of Education and follow policies outlined in the Work-Based Learning Policy Guide available online at https://www.tn.gov/education/educators/career-and-technical-education/work-based-learning.html.