

CAVIT Drone Technology Program

Course Outline and Learning Standards

Semester One - 49.0199.10 sUAS Drones I

Foundational level for advanced exploration in the areas of flying, aerospace engineering, and unmanned aircraft systems. Students will learn about engineering practices, problem-solving, and the innovations and technological developments that have made today's aviation and aerospace industries possible.

Semester Two - 49.0199.20 sUAS Drones II

Provides the background required by the Federal Aviation Administration in subject areas including: aerodynamics, aircraft performance, navigation, weather, and aviation regulations leading to pilot certification. Ground school preparation towards the Private Pilot and Unmanned Aerial Systems (UAS) Certificates.

Semester One - 49.0199.10 sUAS Drones I

1.0 DESCRIBE THE MAJOR TYPES, GROUPS, AND CATEGORIES OF UAS.

- 1.1 Explain the term Unmanned Aircraft System
- 1.2 Explain the changing view on UAS
- 1.3 Explain the evolution of commercial UAS operations in the United States
- 1.4 Identify the major challenges facing the UAS industry
- 1.5 Explain UAS component reliability and operational considerations

2.0 RECALL KEY ASPECTS OF THE UAS FLIGHT APPROVAL AND AUTHORIZATION PROCESS.

- 2.1 Explain how the FAA enforces regulations and minimum standards
- 2.2 Explain how the FAA regulates aircraft, airmen, and airspace
- 2.3 Explain what is the National Airspace System (NAS)
- 2.4 Explain what are the regulatory limits on UAS

3.0 RECOGNIZE LEGAL AND ETHICAL CONSIDERATIONS FOR SPECIFIC TYPES OF UAS OPERATIONS.

- 3.1 Explain the regulations and policies currently in place for UAS operations
- 3.2 Explain Federal Aviation Regulations (FAR)
- 3.3 Explain the limitations and requirements of Visual Flight Rules (VFR)
- 3.4 Explain state and local rules and regulations governing UAS
- 3.5 Define professionalism and ethics

- 3.6 Describe the foundations of an ethical code of conduct for UAS operators
- 3.7 Explain standards of practice for UAS professionals
- 3.8 Identify the top ethical issues facing sUAS remote pilots
- 3.9 Examine case studies and make judgments about the ethical and professional use of UAS technology
- 3.10 Explain standards of profession and how to apply professionalism in everyday operations

4.0 LIST THE PRIMARY TYPES OF SENSORS USED FOR DATA COLLECTION.

- 4.1 Explain the field of robotics and the subset of aerial robots
- 4.2 Identify common components of unmanned aircraft

5.0 COMPARE AND CONTRAST TYPES OF DETECT, SENSE AND AVOID SYSTEMS.

- 5.1 Explain energy sources available for UAS
- 5.2 Explain how robotic aircraft maneuver and navigate

6.0 DIFFERENTIATE THE VARIOUS LEVELS OF UAS AUTOMATION AND AUTONOMY.

- 6.1 Explain aircraft capabilities and limitations associated with different platform categories
- 6.2 Explain UA aerodynamic principles and performance factors

7.0 DEMONSTRATE PROPER UAS SAFETY PROCEDURES.

- 7.1 Explain various airspace that drones operate inside of
- 7.2 Explain the classes of airspace
- 7.3 Explain Notices to Airmen information reporting system
- 7.4 Describe the types and causes of human errors
- 7.5 Explain human limitations in perception, processing, and performance
- 7.6 Describe the physiological effects of drugs and alcohol
- 7.7 Explain the aspects of UAS design and operations that hinder or limit human function and cognition
- 7.8 Describe methods for dealing with automation and the lack of sensory cues
- 7.9 Examine the evolution of CRM as a control for error
- 7.10 Explain the purpose of CRM
- 7.11 Explain decision behaviors as a CRM skillset
- 7.12 Explain Situational Awareness (SA)

7.13 Identify and explain the need for standard communication

7.14 Explain non-technical skills that can improve the function and efficiency of a UAS crew

Semester Two - 49.0199.20 sUAS Drones II

8.0 EXPLAIN THE BASICS OF AIRPLANE SYSTEMS AND UNDERSTANDING OF AERODYNAMIC PRINCIPLES.

8.1 Explain the four forces that act upon a UAS

8.2 Describe the six degrees of freedom.

9.0 IDENTIFY NECESSARY INFORMATION ABOUT THE ENVIRONMENT IN WHICH THE VEHICLE WILL BE FLOWN SUCH AS AIRPORT FACILITIES, AIR TRAFFIC CONTROL SERVICES, COMMUNICATION PROCEDURES, AND SOURCES OF FLIGHT INFORMATION.

9.1 Examine other elements that affect a UAS's operation

9.2 Describe aspects of the physical environment that pose a hazard to UAS

9.3 Explain the concepts of weather as they pertain to aviation

9.4 Explore official and unofficial sources of weather that can inform a remote pilot's preflight decisions

9.5 Interpret "official" sources of weather to make sound decisions

10.0 DESCRIBE VARIABLE ATMOSPHERE AND ITS EFFECT ON AIRCRAFT OPERATIONS, HOW TO MAXIMIZE SAFETY BY MINIMIZING EXPOSURE TO WEATHER-RELATED AVIATION HAZARDS.

10.1 Interpret center NOTAMs

10.2 Explain aviation communications

10.3 Explain the essential information required in aviation communications

11. JUSTIFY AIRCRAFT CAPABILITIES AND LIMITATIONS IN TERMS OF PERFORMANCE PARAMETERS.

11.1 Describe how stabilization, control, and power can be manipulated to fly a UAS

11.2 Describe the aerodynamic principles that affect UAS performance.

11.3 Explain the effects of weather, temperature, and system weight on unmanned aircraft performance

11.4 Explain the differences in rotor and fixed-wing aerodynamics

12.0 EXECUTE THE BASICS OF NAVIGATION USING CHARTS AND RADIO AIDS.

12.1 Interpret aeronautical charts to determine airspace for a given location

12.2 Explain the Aeronautical Information Manual to make a radio call

12.3 Explain airport operations and Traffic-pattern protocols

12.4 Explain UAS limitations and regulations

12.5 Explain the reporting requirements for UAS operations

13. DEMONSTRATE THE APPLICATION OF AERONAUTICAL DECISION-MAKING PRINCIPLES AND FLIGHT-RELATED PHYSIOLOGICAL FACTORS.

13.1 Define aeronautical decision-making

13.2 Examine the steps for sound aeronautical decision-making

13.3 Identify hazards associated with UAS operations

13.4 Explain various models for decision-making

13.5 Apply good aeronautical decision-making

13.6 Describe strategies for dealing with task saturation or overloads

13.7 Demonstrate the ability to think independently while exercising adaptability to stressful situations

13.8 Explain airworthiness inspections

14. PERFORM DRAFTING TASKS.

14.1 Make freehand sketches (e.g., line weights, hidden lines, center lines, and dimensioning)

14.2 Make CAD representations from freehand sketches

14.3 Determine shapes and sizes of surfaces from alternative views (e.g., orthographic, projection view, first angle projection, and third angle projection)

14.4 Make CAD drawings using geometric construction techniques

14.5 Make dimensional CAD drawings (e.g., 2D and 3D)

14.6 Explain basic knowledge of geometric dimensioning and tolerancing

14.7 Interpret unmanned aircraft system (e.g Drone Body and controller) plans