Unit 1
Standards and Objectives

OVERVIEW

Unit 1: An Introduction to Drone Use, Cases and Flying, and Regulations

Topics:

- Introduction to Flying Drones
- Overview of Drone Use Cases
- Introduction to Part 107
- Part 107 Lesson 1: Regulations

UNIT OBJECTIVE

Essential Knowledge and Understandings

Drones, also known as Unmanned Aerial Vehicles (UAVs), have revolutionized numerous industries and our daily lives with versatile capabilities. With advancements in technology, drones have become more accessible and affordable, allowing individuals and businesses to harness their power for various purposes. However, their increasing popularity has also raised concerns about privacy, safety, and regulations that seek to balance innovation with responsibility. Embracing the future of aerial technology, the introduction of drones signifies the pivotal moment in how we interact with the world around us.

Offering a bird's eye view, drones are utilized in fields such as photography, agriculture, land surveying, and even package delivery services. In journalism and filmmaking, drones provide stunning aerial shots that were once only possible with expensive equipment. In agriculture, drones are used to monitor crop health, optimize irrigation, and even spray pesticides, leading to increased efficiency and reduced environmental impact. Search and rescue operations benefit from drones by covering large areas quickly and reaching inaccessible locations. Furthermore, drones play a crucial role in military operations, allowing for surveillance, reconnaissance, and targeted airstrikes. With their wide range of applications, drones continue to shape and enhance industries across the globe.

In addition to identifying the practicality of and innovation to drone use, this unit will introduce to students the applicable regulations relating to sUAS rating privileges, limitations, and flight operations. Part 107 is the FAA's first UAS rule. It covers operational limitations, operator certification, operator responsibilities and aircraft requirements.

EDUCATION STANDARDS

Essential Skills

- Determine strategies for effective decision making in the UAV industry
- Determine effective communication skills
- Demonstrate effective leadership styles
- Identify current and emerging careers in the UAV industry
- Identify the credentials and certification requirements for careers in the UAV industry such as licensed pilot
- Research and compile health and safety policies, procedures, regulations, and practices of the UAV industry
- Use UAV technological resources in diverse and changing personal, community, and workplace environments
- Define legal terminology that is used in the UAV industry
- Discuss professional responsivity as it relates to the FAA part 107 license
- Discuss ethical UAV operation as it relates to current regulations
- Identify common organizational norms present within the UAV industry
- Define terminology applicable to the operation of UAVs in FAA documentation, including remote pilot in command
- Explain and analyze the application of emergency powers of a remote pilot in command

LEARNING OBJECTIVES

sUAS Part 107 Lesson 1 - Regulations

- Describe the applicability of Part 107 to sUAS operations
- Describe definitions used in Part 107
- Describe ramifications of falsification, reproduction or alteration of certificate, rating, authorization, record or report
- Describe the requirements for inspection, testing and demonstration of compliance
- Describe the requirement for the sUAS to be in a safe condition for safe operation
- Describe medical condition(s) that would interfere with safe operation of an sUAS
- Describe the responsibilities and authority of the remote PIC

- Describe the responsibility and authority of the remote PIC to allow another person other than the remote PIC manipulate the flight controls
- Identify hazardous operation, to include careless or reckless behavior or allowing an object to be dropped
- Describe the restrictions for operations from a moving vehicle (air, land or sea)
- Describe regulations applying to daylight operations
- Describe regulations applying to visual line of sight aircraft operations
- Describe regulations and requirements when a visual observer is used
- Demonstrate understanding of the prohibition of carrying hazardous material
- Describe the right was of rules, to include requirements to safely stay away from other aircraft (see and avoid), and other potential hazard considerations of the remote PIC
- Describe regulations applying to operations over people
- Describe the operating limitations for sUAS, to include maximum ground speed, altitude limitations, minimum visibility and cloud clearance requirements
- List the eligibility requirements for a Remote Pilot Certificate with Small UAS Rating
- Describe the aeronautical knowledge recency requirements to maintain a Remote Pilot Certificate
- Describe the waiver policy and accompanying regulatory subject matter, safety requirements and special provisions

Flight Training

- State common sUAS drone missions
- List characteristics of multirotor platforms
- Explain the differences between prosumer and professional model drones
- List popular sUAS manufacturers and their primary platforms
- State key system specifications
- Describe sUAS lithium ion batteries
- Identify sUAS propellers
- Explain the purpose and function of the flight controller
- Explain the purpose and function of the electronic speed controller (ESC)
- Explain the purpose and function of sUAS IMUs
- Describe the purpose of the aircraft magnetometer
- Describe the purpose of the aircraft barometer
- Explain the purpose and function of the GNSS module
- Describe the omnidirectional obstacle sensing system
- Distinguish obstacle detection sensor capability by model
- Explain the purpose and function of the vision system
- Identify surfaces that can negatively impact vision system accuracy
- Locate vision system sensors
- Locate infrared sensing system sensors
- Describe the function of the Advanced Pilot Assistance System (APAS)
- Explain how to use the controller
- Describe the components of a small UAS imaging payload

- Describe the initial system set-up process
- Explain how to launch and run the primary system software
- Explain how to update aircraft firmware
- Identify & access the System Status Menu
- Describe proper Flight Mode selection
- Explain how to confirm GPS connectivity & assess signal integrity
- Explain how to evaluate vision system status
- Explain how to confirm datalink and HD video link integrity
- Identify the main components of the dynamic power management display
- Identify the Camera Settings Display & touchscreen controls
- Identify the map display and critical reference points
- Explain the purpose of flight telemetry data and how it is used by the PIC
- Describe how to connect device to controller (as required)
- State the proper power on sequence
- Select the proper flight mode
- Explain how to check battery level
- Explain how to check aircraft status
- Describe the compass calibration procedure
- Describe how to verify proper location and home point on the map
- Explain the process to start aircraft motors
- Explain how to execute aircraft takeoff
- Describe controller stick commands
- Explain how to execute aircraft return, landing and shutdown
- State the proper power down sequence
- Describe how to access and navigate the settings menu
- Recall how to calibrate the compass
- Explain how to switch from beginner mode to multiple flight mode
- Describe the purpose and the Return-to-Home (RTH) function
- Explain how to set the RTH altitude
- Describe the steps taken by the system when RTH is initiated
- Describe the RTH Obstacle Avoidance function
- Describe how to set the maximum flight altitude
- Describe how to verify and set measurement units
- Describe how to format the SD card
- Explain how to access camera settings
- Explain how to adjust control response
- State the function of Expo, Sensitivity and Gain
- Describe how gimbal settings can impact image quality
- Describe gimbal settings and tuning
- Describe how to customize C1 and C2 buttons
- Explain the process for livestreaming
- Describe the process for calibrating the IMU
- Describe the process for calibrating the remote controller
- Explain how to enable obstacle sensors

- Explain the purpose of changing gimbal configuration to improve mapping and modeling data
- Identify how to access the Intelligent Mode Menu
- Explain the purpose and configuration process for Course Lock mode
- Explain the purpose and configuration process for Home Lock
- Explain the purpose and configuration process for Point of Interest
- Explain the purpose and configuration process for Follow Me
- Explain the purpose and configuration process for Waypoints
- Explain the purpose and configuration process for Active Track
- Explain the purpose and configuration process for Tap Fly
- Explain the purpose and configuration process for Draw
- Explain the purpose and configuration process for Gesture Mode
- Explain the purpose and configuration process for Tripod
- Explain the purpose and configuration process for Terrain Follow
- Explain the purpose and configuration process for Hyperlapse
- Explain the purpose and configuration process for QuickShot
- Explain the purpose and configuration process for Active Track 2.0
- Explain the purpose and configuration process for Point of Interest 2.0
- Explain the purpose and configuration process for Waypoints
- Explain the purpose and configuration process for Cinematic Mode
- Describe the process of interrupting autonomous flight to resume manual control
- Describe the process for to exiting Intelligent Modes

Career Exploration: Introduction, Use Cases, and Ethical and Professional Responsibility

- Describe the potential career paths of a drone pilot
- List 30 drone use cases
- Explain the opportunities in the drone industry
- Practice effective communication skills
- Describe steps to solving a problem
- Practice critical thinking skills
- Describe how to give feedback to a team member
- Practice developing a listening attitude
- Describe how to gain and show respect
- Describe how to demonstrate responsibility
- Describe ethical responsibility as a drone pilot
- Describe a plan for using drones in personal life and community