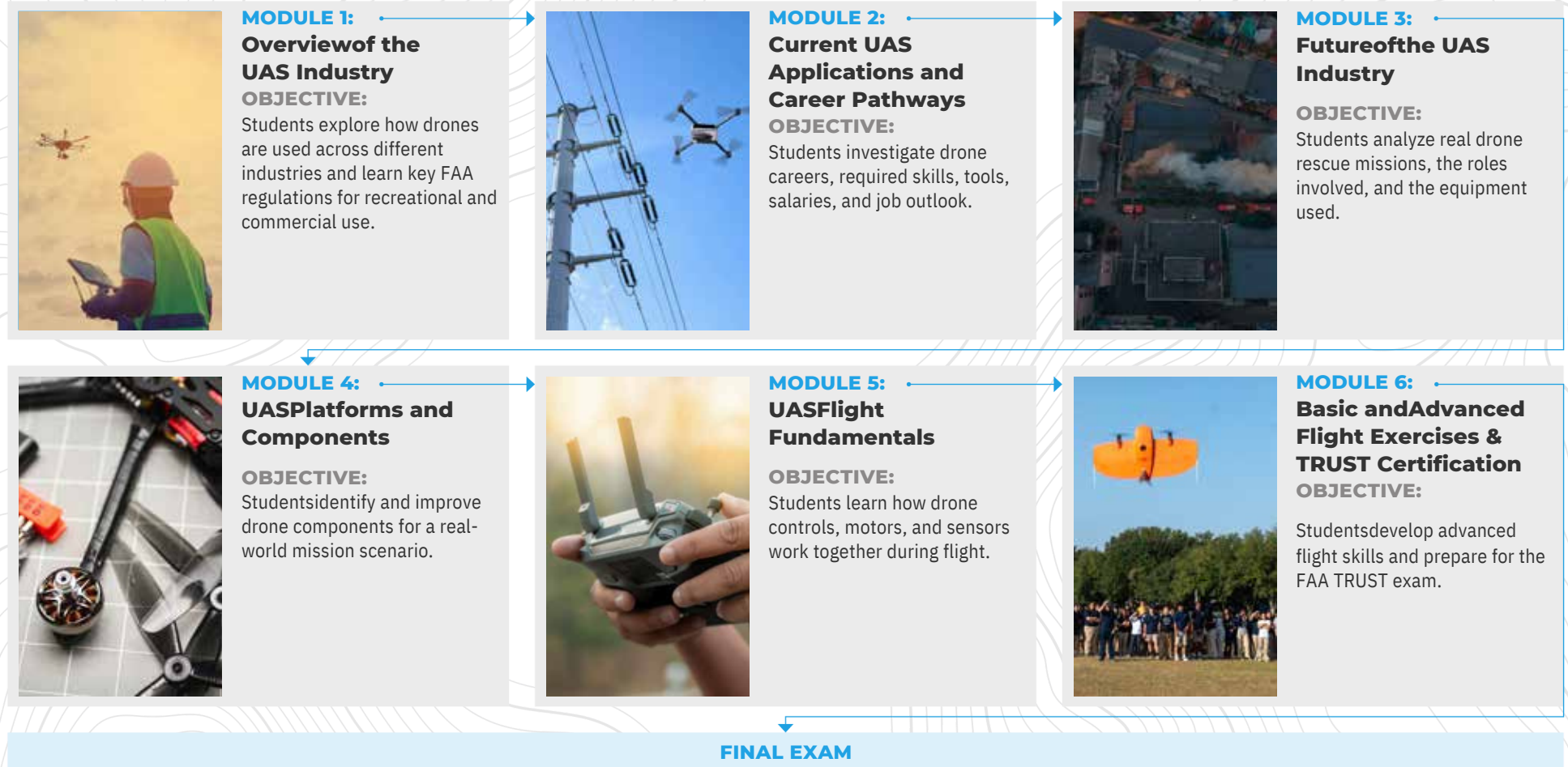


# Drone Technology and Flight Fundamentals (9 weeks)

## OBJECTIVE:

This course introduces students to the UAS industry, drone components, and essential flight operations. Students also complete the FAA TRUST exam and gain practical flight skills through basic and advanced exercises.

## UNITS/MODULES:



# Commercial Drone Licensure and Part 107 Exam Prep (9 weeks)

## OBJECTIVE:

This course prepares students for the FAA Part 107 Remote Pilot Certificate exam. Students will learn about airspace classifications, weather, airport operations, aircraft performance, and emergency protocols for safe and legal commercial drone use.

## UNITS/MODULES:



# Drones in Agriculture

## Unit 1:

### Intro to Drones in Agriculture



#### Lesson 1

##### Intro to Drones in Agriculture

###### OBJECTIVE:

Understand what agricultural drones are, how they are used across crop and livestock operations, and where they fit in the history of precision agriculture technology.

#### Lesson 2

##### Ag Careers that Use Drones

###### OBJECTIVE:

Identify specific career roles that use drone skills in agriculture and understand the credentials, pathways, and responsibilities associated with those careers.

#### Lesson 3 Drone Flight Basics for Agriculture

OBJECTIVE: Demonstrate safe drone operation fundamentals, including farm-specific hazards and best practices for flying near livestock and equipment.

## Unit 2:

### Ag Drone Tech and Drone Mapping



#### Lesson 4

##### Ag Drone Sensors and Platforms

###### OBJECTIVE:

Compare drone types and sensor options used in agriculture and select the appropriate platform and payload for a given farm task.

#### Lesson 5

##### Flight Planning and Data Collection

###### OBJECTIVE:

Plan and document a drone mission that produces reliable, repeatable agricultural data by making decisions about flight parameters, timing, and weather conditions.

#### Lesson 6

##### Intro to Photogrammetry

###### OBJECTIVE:

Explain how overlapping drone images are processed into orthomosaics, elevation models, and 3D maps that farmers use to analyze their fields.

## Unit 3:

### Reading Agricultural Drone Data



#### Lesson 7

##### Crop Health and Vegetation Data

###### OBJECTIVE:

Interpret NDVI and multispectral imagery to identify crop stress patterns, nutrient deficiencies, and pest or disease pressure.

#### Lesson 8 Livestock, Soil, and Water Data

OBJECTIVE: Read thermal and elevation data to conduct herd counts, assess pasture health, identify soil variability, and detect irrigation issues.

#### Lesson 9

##### Decision Making with Drone Data

###### OBJECTIVE:

Translate drone data into specific farm management actions, including variable rate application maps, targeted IPM treatments, and livestock management decisions.

## Unit 4:

### Operations and Real World Applications



#### Lesson 10

##### Safety and Regulations

###### OBJECTIVE:

Identify FAA requirements, agricultural safety hazards, and the ethical and privacy responsibilities that come with professional drone operations on farms.

#### Lesson 11

##### Business Operations

###### OBJECTIVE:

Analyze the economics of agricultural drone services, including ROI calculations, pricing models, and the workflow of a professional drone service provider.

#### Lesson 12 Capstone Presentations/Delivery

OBJECTIVE: Present a complete drone solution for a real-world ag scenario, demonstrating mastery of hardware selection, mission planning, data interpretation, and decision-making.

## Unit 1: Foundations of Drones in Construction



### Lesson 1 Intro to Drones in Construction

OBJECTIVE:  
Identify the primary use cases for drone technology across the lifecycle of a commercial construction or heavy civil project.

### Lesson 2 Construction Careers with Drones

OBJECTIVE:  
Map drone skills to specific, high-demand occupations within the construction industry.

### Lesson 3 Drone Flight Basics and Jobsite Safety (OSHA)

OBJECTIVE:  
Execute basic flight maneuvers while adhering to OSHA safety protocols for active construction sites.

## Unit 2: Hardware and Data Capture



### Lesson 4 Drone Hardware for Construction

OBJECTIVE:  
Select the appropriate drone airframe and payload for specific construction tasks.

### Lesson 5 Site Surveying and Topographic Mapping

OBJECTIVE:  
Plan a drone mapping mission to establish baseline site conditions and topographic contours.

### Lesson 6 Progress Monitoring and Documentation

OBJECTIVE:  
Design a repeatable flight plan for weekly schedule management and subcontractor tracking.

## Unit 3: Earthwork and Estimating



### Lesson 7 Photogrammetry for Construction

OBJECTIVE:  
Explain how photogrammetry software processes 2D drone imagery into actionable 3D site data.

### Lesson 8 Volume Calculations, Grading, and Earthwork

OBJECTIVE:  
Use drone-generated Digital Elevation Models (DEMs) to calculate earthwork volumes.

### Lesson 9 Drone Data for Project Management & Estimating

OBJECTIVE:  
Extract measurements from drone data to estimate material costs and manage project budgets.

## Unit 4: Inspection and Compliance



### Lesson 10 Structural and Site Inspection

OBJECTIVE:  
Plan and execute a drone flight to inspect structural elements for building code compliance.

### Lesson 11 Environmental Compliance & Erosion Control

OBJECTIVE: Use drone imagery to monitor jobsite environmental compliance and stormwater management.

### Lesson 12 Capstone Presentations/Delivery

OBJECTIVE: Synthesize module concepts to develop a comprehensive drone operations plan for a hypothetical commercial construction project.

## Unit 1: Foundations of Drone Media



### Lesson 1

#### **Intro to Aerial Media**

**OBJECTIVE:**

Identify how drones have transformed visual media production and analyze the aesthetic and practical advantages of aerial perspectives over traditional camera platforms.

### Lesson 2

#### **Careers in Drone Media**

**OBJECTIVE:**

Map specific drone operation and editing skills to high-demand occupations within the Arts/Media sector, including the credentials and portfolio expectations.

### Lesson 3 Intro to Drone Flight

**OBJECTIVE:** Safely execute basic flight maneuvers, demonstrating control over altitude, pitch, roll, and yaw as the foundation for smooth cinematic camera work.

## Unit 2: Drone Camera Skills and Flight Techniques



### Lesson 4

#### **Drone Camera Settings**

**OBJECTIVE:**

Manually configure drone camera settings, including ISO, shutter speed, frame rate, and ND filters, to achieve proper exposure and cinematic motion blur.

### Lesson 5

#### **Cinematic Drone Movements**

**OBJECTIVE:**

Execute complex, multi-axis drone movements such as the reveal, the orbit, and the tracking shot to evoke emotion and advance a visual narrative.

### Lesson 6

#### **Flight Planning for Media Shots**

**OBJECTIVE:**

Translate a creative storyboard into a safe, actionable flight plan that accounts for lighting conditions, location hazards, and battery management.

## Unit 3: Editing and Content Creation



### Lesson 7

#### **Video Editing with Aerial Footage**

**OBJECTIVE:**

Import, organize, and assemble raw drone footage into a coherent sequence using a non-linear editing system.

### Lesson 8

#### **Music, Sound, and Story**

**OBJECTIVE:**

Synchronize aerial visuals with music and ambient audio, using rhythm and pacing to structure a compelling and emotionally resonant video.

### Lesson 9

#### **Editing for Different Industries**

**OBJECTIVE:**

Adapt editing style, color grading, and pacing to meet the specific visual conventions of different commercial industries such as real estate, action sports, and documentary.

## Unit 4: Real World Media Production



### Lesson 10 Drone Rules for Filming

**OBJECTIVE:** Navigate FAA regulations, local permitting requirements, and privacy laws specific to commercial aerial filming in professional media production.

### Lesson 11 Media Projects and Client Work

**OBJECTIVE:** Manage a media project from client pitch through final delivery, including interpreting a creative brief, handling revisions, and exporting files in the correct format.

### Lesson 12

#### **Capstone Presentations/Delivery**

**OBJECTIVE:**

Synthesize all pre-production, production, and post-production skills to produce a complete, polished aerial video campaign from storyboard to final cut.

## Unit 1: Foundations of Drones in Engineering



### Lesson 1 Intro to Drones in Engineering

OBJECTIVE:

Identify and explain how drone technology is utilized across various engineering disciplines (civil, structural, environmental) to improve the design process.

### Lesson 2 Engineering Careers with Drones

OBJECTIVE:

Map specific drone operation and data analysis skills to high-demand engineering occupations and industry certifications.

### Lesson 3 Drone Flight Basics for Engineering

OBJECTIVE:

Execute basic flight maneuvers while explaining the aerodynamic forces (lift, weight, thrust, drag) that govern unmanned aerial vehicles.

## Unit 2: Drone Systems and Data Acquisition



### Lesson 4 Drone Hardware and Sensors

OBJECTIVE:

Evaluate and select appropriate drone hardware, sensors (RGB, LiDAR, Thermal), and control systems for specific engineering applications.

### Lesson 5 Site Surveying and Topographic Mapping

OBJECTIVE:

Plan an autonomous mapping mission to capture accurate topographic data for civil engineering site design.

### Lesson 6 Drones for As-Built Documentation

OBJECTIVE:

Explain how drone imagery is used to capture and document existing structures as accurate as-built CAD models.

## Unit 3: Modeling and Analysis



### Lesson 7 Photogrammetry & 3D Modeling

OBJECTIVE:

Describe the photogrammetry process and how overlapping 2D images are stitched together to create 3D solid models.

### Lesson 8 Structural Analysis & Loads

OBJECTIVE:

Analyze drone-captured data to identify structural defects and evaluate load conditions on existing infrastructure.

### Lesson 9 BIM Integration & Digital Twins

OBJECTIVE:

Describe the concept of a Digital Twin and how drone data is integrated into Building Information Modeling (BIM) workflows.

## Unit 4: Application and Capstone



### Lesson 10 Infrastructure Inspection & Evaluation

OBJECTIVE:

design a comprehensive inspection flight plan for a large-scale infrastructure asset.

### Lesson 11 Environmental Engineering & Watersheds

OBJECTIVE:

Use topographic drone data to analyze site drainage, stormwater runoff, and environmental impacts.

### Lesson 12 Capstone Presentations/Delivery

OBJECTIVE:

Synthesize drone data acquisition, CAD/BIM integration, and structural/environmental analysis into a formal engineering design proposal.