



Counter Unmanned Aircraft Systems, Mobile

Course Design Document

CUAS, Mobile, Course Design Document, Version IC2020(a)

FEMA/TPP

Cooperative Agreement Number EMW-2018-CA-00048



FEMA





FEMA

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Course Overview

Details

Title	Counter Unmanned Aircraft Systems, Mobile
Catalog Number	TBD
Delivery Method	Mobile
Course Level	Awareness
Core Capability	Threats and Hazards Identification (Mitigation)
Mission Area(s)	Prevention, Protection, Mitigation, Response
Duration in Days	1
Duration in Hours	8
CEUs	.08
Training Certificate	NMT/EMRTC Certificate of Attendance, Certificate of Completion
Date Certified	
Version	IC2020(a)

Description

Unmanned Aircraft Systems (UAS) represent the next wave of innovation in aviation. While these systems have been used extensively in overseas military operations for decades, the technology is relatively new to hobbyists and for commercial applications. UAS are beginning to fly in unprecedented numbers in the U.S. airspace. Most users of UAS technology today are recreational hobbyists, commercial entities or public use aircraft operators who conduct flights within published guidelines and regulations. However, there are some who operate negligently, and worst yet, there are those who intentionally use UAS for malicious and nefarious purposes. Negligent hobbyist UAS operators have disrupted first responder operations such as wildfire suppression and search and rescue efforts, while criminal organizations are using UAS to smuggle contraband into restricted areas like prisons, and to conduct illicit or illegal surveillance at our borders and high-value infrastructure. Overseas, terrorists have used UAS with success to drop bombs on allied troops.

Recently, the Department of Defense (DoD) issued an Urgent Needs Statement (UNS) to its military systems commands to rapidly develop Counter UAS (CUAS) technologies. However, technology alone isn't the answer. To properly counter this new threat, emergency and first responder personnel need to understand the methods being used by the various operators and respond with the appropriate tactics, techniques and procedures (TTPs) to counter them.

Success in countering this threat is linked to the elements, concepts, and principles of core CUAS activities: Detect, Identify, Track, Assess, Mitigate and Respond. Successful CUAS responses will be predicated on the knowledge, understanding, proficiency, and appropriate TTPs used by state/local Homeland Security personnel, Office of Emergency Management personnel, and first responders. These individuals must be adequately trained and equipped to ensure their ability to effectively respond to the hazards and dangers of UAS posed by unintentional, negligent, and/or malicious use.

Terminal Learning Objectives (TLOs)

1. Recognize Unmanned Aircraft Systems (UAS) uses and components
2. Recognize the threat posed by the criminal and terrorist use of commercially available Unmanned Aircraft Systems (UAS) technology.
3. Identify Counter-Unmanned Aircraft Systems (CUAS) tactics available to emergency first responders.
4. Recognize regulations, laws, and policies pertaining to the use of Unmanned Aircraft Systems (UAS).
5. Discuss CUAS Tactics, Techniques and Procedures (TTPs) used throughout a case study.
6. Identify TTPs to detect UAS activity using visual, audio or technological resources.
7. Distinguish between types of UAS, payloads, and legal/safe operations.
8. Recognize effective methods to track UAS activity and communicate to appropriate authorities.
9. Assess Unmanned Aircraft Systems (UAS) activity and recommend response options and considerations
10. Discuss response considerations to respond and deter unsafe, unauthorized, illegal, or terrorist Unmanned Aircraft Systems (UAS) activity
11. Understand evidence collection and reporting Unmanned Aircraft Systems (UAS) activity to appropriate agencies

Target Audience

- State and local first responders
- Law enforcement
- Fire service
- Emergency response personnel

Prerequisites

- United States citizenship.

Modules

Title	Duration (hours)
Module 1 Introduction	0.50
Module 2 Introduction to Unmanned Aircraft Systems (UAS)	0.50
Module 3 UAS as a Threat	0.50
Module 4 CUAS Regulations and Tactics	0.75
Module 5 Case Study Overview	0.50
Module 6 Detect and Identify UAS Activity	1.0
Module 7 Track and Assess UAS Activity	1.0
Module 8 Respond and Report UAS Activity	1.0
Module 9 Conclusion	0.50

Testing and Certification

Participants are administered a pre-test and a post-test during the course. The post-test enables program administrators to assess the level of learning attained by participants. Post-test requirements evaluate the ability of participants to meet the learning objectives presented in the course. Participants are awarded one of the following certificates by NMT/EMRTC after completing a course:

1. Certificate of Attendance
2. Certificate of Completion
3. Certificate of Completion – Train-the-Trainer

Each certificate requires the participant to meet certain conditions as follows:

Certificate Awarded	Condition	Result
Certificate of Attendance	Participant has attended the course but has not achieved a 70% score or higher on the post-test knowledge assessment.	Participant is certified to have attended the course.
Certificate of Completion	Participant has attended the course and has achieved a 70% score or higher on the post-test knowledge assessment.	Participant is certified to have attended and successfully completed the course. Academic credit is available to participant.

To receive a Certificate of Completion - Train-the-Trainer, participants must provide instructor certification documentation from their local agency/state to NMT/EMRTC prior to attending the course. Note that this information is provided to participants prior to attending the course and only applies to residential courses.

Evaluation Strategies

Participant perception of learning (Kirkpatrick’s Level 1) will be measured by the DHS Student Assessment of Course and Instructors Form, to be filled out by the participants at the end of each course, as required by DHS. Pre- and post-test questions and performance activities will be used to determine mastery of the course objectives (Kirkpatrick’s Level 2).

Required Materials and Resources

- Facilities
- Classroom Materials
- Participant Materials (Per Participant)

References

- Federal Aviation Administration (FAA) Law Enforcement Card
- FAA Law Enforcement Guidance
- FAA Modernization and Reform Act of 2012
- FAA Reauthorization Act of 2018
- Public Law 112-95
- National Institute of Justice
- USMC Low Altitude Air Defense (LAAD) Training & Readiness Manual
- 14 Code of Federal Regulations (CFR) Part 1
- 14 CFR Part 107

Module 1 Introduction

Duration 1.5 hours

Scope Statement

In this module, participants are presented with information on the Federal Emergency Management Agency (FEMA), New Mexico Tech (NMT) and the Energetic Materials Research and Testing Center (EMRTC) as it pertains to the development and purpose of this course. Instructors and participants discuss course expectations and learning objectives and their outcomes. Additionally, administrative and procedural information is presented regarding the successful operation of the course. This module concludes with the administration of a knowledge assessment to measure entry-level participant knowledge of the subject presented in the course.

Terminal Learning Objective (TLO)

- N/A

Enabling Learning Objectives (ELOs)

- N/A

Instructional Strategy

- Instructor-led presentation
- Instructor-guided discussion

Assessment Strategy

- Observation of the level and quality of classroom participation
- Administration of the course pre-test to assess participants' entry-level knowledge of the subject presented in the course

Lesson Topics

- Introduction
 - Introduction
 - U.S. Department of Homeland Security
 - Distribution Limits
 - Course Warnings
 - Emergency Procedures
 - Learning Accommodations
 - NMT/EMRTC
 - Playas Training and Research Center
 - Video: New Mexico Tech
 - Video: National Domestic Preparedness Consortium (NDPC)
 - DHS FEMA Mission Areas
 - DHS Community Lifelines
- Course Information
 - Counter Unmanned Aircraft Systems (CUAS)
 - CUAS Tactic Framework
 - Course Map

- Classroom Guidelines
 - Field Laboratory Guidelines
 - Completion and Certification
- Knowledge Assessment
 - Knowledge Assessment: Pre-Test, Cont.
- Participant Introductions
- Summary
 - Summary

Practical Exercise Statement

There are no practical exercises associated with this module.

Module 2 Introduction to Unmanned Aircraft Systems (UAS)

Duration 0.50 hours

Scope Statement

An introduction to UAS, this module presents baseline information on UAS. The participant will learn multiple UAS formats and respective functions through provided examples of UAS applications in agriculture, firefighting, law enforcement, and commerce. This module emphasizes the six key components of the UAS system; the air vehicle, sensor/payload, data link, ground system, flight crew, and ground support equipment. The module concludes with an introduction to Counter UAS (CUAS), which will be elaborated upon in subsequent modules.

Terminal Learning Objective (TLO)

- Recognize Unmanned Aircraft Systems (UAS) uses and components

Enabling Learning Objectives (ELOs)

- Identify UAS types and their components
- Identify UAS commercial uses

Instructional Strategy

- Instructor-led presentation
- Instructor-guided discussion

Assessment Strategy

- Observation of the level and quality of classroom participation

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - Overview
- Introduction to UAS
 - Components of a UAS
 - Aircraft Sizes and Types
 - Sensors/Payloads
 - Data Link
 - Ground Control Station (GCS)
 - Flight Crew
 - UAS Uses
 - UAS in Agriculture
 - UAS in Firefighting
 - UAS in Law Enforcement
- Discussion
 - Discussion
- Summary
 - Summary

Module 3 UAS as a Threat

Duration 0.50 hours

Scope Statement

UAS continue to evolve as a threat and are readily being adopted as a useful tool for criminals and terrorists alike. This module discusses the evolution of unmanned airborne threats from crude balloon designs to the modern criminal and terrorist uses of commercially available UAS. Establishing a threat baseline for participants provides context and significance for CUAS tactics taught in follow-on modules and enhances the key learning points of the course.

Terminal Learning Objective (TLO)

- Recognize the threat posed by the criminal and terrorist use of commercially available Unmanned Aircraft Systems (UAS) technology

Enabling Learning Objectives (ELOs)

- Recognize the illegal use of UAS
- Recognize the terrorist use of UAS

Instructional Strategy

- Instructor-led presentation
- Instructor-guided discussion

Assessment Strategy

- Observation of the level and quality of classroom participation

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - Learning Objectives
- UAS as Threat
 - The Kettering Bug
 - Criminal Use of UAS
 - Criminal Use of UAS, Cont.
 - Video: Prison Contraband
 - Reckless Endangerment
- Suspicious/Terrorist Use of UAS
 - Terror Usage of UAS
 - Video: Propaganda
 - Video: Intelligence, Surveillance, and Reconnaissance (ISR)
 - Modifications
 - Example UAS Munitions
 - Video: Fears for the Future
 - What's Next?
- Discussion

- Discussion
- Summary
 - Summary

Module 4 Regulations and Tactics Overview

Duration 0.75 hours

Scope Statement

Referencing the underlying legal prohibitions preventing the use of CUAS defeat technologies, this module will introduce the concept of what tactics First Responders could utilize when confronted with unplanned UAS reporting and/or sightings. Participants will be introduced to basic CUAS tactics currently employed in a military setting in order to differentiate between those technologies which exist and what mindset today's First Responder can adopt in the United States. The building blocks for allowable CUAS actions will be introduced as concepts starting as a new CUAS logical framework, a look at problem solving, and a proposed decision cycle – all which will lead to allowable tactics, techniques and procedures First Responders could employ within today's allowable CUAS legal parameters.

Terminal Learning Objective (TLO)

- Identify Counter-Unmanned Aircraft Systems (CUAS) tactics available to emergency first responders.
- Recognize regulations, laws, and policies pertaining to the use of Unmanned Aircraft Systems (UAS).

Enabling Learning Objectives (ELOs)

- Recognize the different between military and first responder CUAS tactics
- Identify the six CUAS tactics used by first responders: Detect, Identify, Track, Assess, Respond, and Report
- Discuss regulations which apply to the use of UAS
- Define controlled airspace in relation to FAA regulations
- Determine agency authority to enforce FAA regulation

Instructional Strategy

- Instructor-led presentation
- Instructor-guided discussion

Assessment Strategy

- Observation of the level and quality of classroom participation

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - Learning Objectives
- UAS Regulations
 - Overview of Federal UAS Regulations
 - Changing Regulations/Rules
 - Commercial Regulations
 - Hobbyist Rules
 - Commercial and Hobbyist Regulations

- Commercial and Hobbyist Regulations, Cont.
 - Waivers
 - Airspace
 - State and Local Restrictions
 - CUAS Legal Considerations
 - Reporting – State/Local Agencies
- CUAS Tactics
 - Challenge of CUAS Tactics
 - Military vs. First Responder Tactics
 - Video: Kinetic Kill Technology
 - CUAS Tactics: First Responder
 - Decision Cycle
 - CUAS Tactics
- Summary
 - Summary

Module 5 Case Study Overview

Duration 0.5 hours

Scope Statement

The module focuses on a series of intentional UAS flights over two 2017 San Francisco Bay Area NFL football games and presents students with real life examples related to the complexities of CUAS planning and response to any event. This module is designed to highlight how two separate (but related) events led law enforcement to coordinate an initial response to identify and arrest the individual operating a modified commercial UAV designed to drop propaganda leaflets onto the crowds inside two NFL stadiums. Additionally, the module reinforces learning points with a review of applicable FAA regulations and recently enacted federal UAS laws. Utilizing this case study, students will conclude this module in a guided discussion as they walk through timeline of events for the incident.

Terminal Learning Objective (TLO)

- Discuss CUAS Tactics, Techniques and Procedures (TTPs) used throughout a case study.

Enabling Learning Objectives (ELOs)

- Understand definition and application of CUAS TTPs
- Identify threats, regulations, and tactics concepts as they apply to case study

Instructor to Participant Ratio

- 1 instructor per 50 participants

Instructional Strategy

- Instructor-led presentation

Assessment Strategy

- Observation of the level and quality of classroom participation

Practical Exercise Statement

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - Learning Objectives
 - Case Study – Guided Discussion
- Case Study Overview: NFL San Francisco Bay Area
 - NFL Football Games
 - Levi's Stadium
 - Oakland – Alameda County Coliseum
 - San Jose International Airport (SJC)
 - Oakland International Airport (OAK)
 - Levi's Stadium Security Plan

- Oakland Coliseum Security Plan
- Discussion
 - Guided Discussion
- Summary
 - Summary

Module 6 Detect and Identify UAS Activity

Duration 1.0 hour

Scope Statement

With an emphasis on identifying the UAS operator, this module will demonstrate basic visual and audio detection techniques, and the TTPs employed to detect the operator. The use of CUAS technology will be introduced in this module as a means to make UAS detection more accurate. During this module, participants are taught why the identification of a UAS, the type of payload, and the classes and categories of the UAS are important. The potential for lethal payloads will be elaborated upon to include weaponized UAS and bomb-dropping UAS. Overall, students will understand a major factor in CUAS operations is identification of the operator to determine the manner and intent of any UAS operation. Finally, ongoing reference to the 2017 NFL case study, students are introduced to the detection and identification TTPs in a logical manner as they walk through timeline of events for the incident.

Terminal Learning Objective (TLO)

- Identify TTPs to detect UAS activity using visual, audio or technological resources
- Distinguish between types of UAS, payloads, and legal/safe operations

Enabling Learning Objectives (ELOs)

- Identify the TTPs to conduct audio detection of a UAS
- Identify the TTPs to conduct visual detection of a UAS
- Identify the TTPs to conduct detection of a UAS operator
- Identify type of UAS
- Classify UAS manufactured and homemade payloads
- Identify UAS operation indicators to determine UAS operation type

Instructor to Participant Ratio

- 1 instructor per 50 participants

Instructional Strategy

- Instructor-led presentation

Assessment Strategy

- Observation of the level and quality of classroom participation

Practical Exercise Statement

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - Learning Objectives
 - Reminder
- Detect UAS Activity

- CUAS Tactics
- Audible Detection: Techniques and Procedures
- Visual Detection: Techniques and Procedures
- CUAS Detection
- Integrated Approach: Combining Sensors
- Detect the Operator
- Detect the Operator, Cont.
- Think Like the Operator
- Operator Detection: Techniques and Procedures
- Identify UAS Activity
 - Class and Category
 - UAS Payload Types
 - Cargo
 - Agricultural Payloads
 - Weapons Payloads
 - Video: Terrorist Drop Systems
 - Standard Commercial Support Equipment
 - Suspicious Support Equipment
 - Identifying the Operator
- Case Study
 - Video: Situation
 - Scenario: Levi's Stadium
 - Scenario: Oakland Stadium
- Discussion
 - Discussion
- Summary
 - Summary

Module 7 Identify and Assess UAS Activity

Duration 1.0 hour

Scope Statement

This module will introduce the steps and techniques to track, forecast intended path/target, call for assistance, and report a UAS activity. Different methods of tracking are introduced, to include visual and technological means. Techniques for location, tracking, recognition and prediction of UAS flight paths will be introduced with an overall understanding that the goal is to effectively communicate this activity to appropriate CUAS officials. The need for collaboration, and fusion with available CUAS technologies, will reinforce accurate location reporting and identification of the UAS operator. Tracking techniques will be proposed with useable memory aids and presented in a fashion first responders can utilize with, or without, CUAS technologies.

Terminal Learning Objective (TLO)

- Recognize effective methods to track UAS activity and communicate to appropriate authorities
- Assess UAS activity and recommend response options and considerations

Enabling Learning Objectives (ELOs)

- Identify analog methods to locate and track UAS
- Report UAS activity using the SPLAT method
- Recognize dangerous UAS activity
- Identify legality of UAS operations
- Discuss appropriate response to UAS

Instructor to Participant Ratio

- 1 instructor per 50 participants

Instructional Strategy

- Instructor-led presentation

Assessment Strategy

- Observation of the level and quality of classroom participation

Practical Exercise Statement

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - Learning Objectives
 - CUAS Tactics
- Track UAS Activity
 - Visual Tracking
 - Fundamentals of Tracking

- ASSUME: Not always a bad thing
 - Tracking Basics
 - Move as Necessary
 - UAS to Operator
 - Visual Tracking Technique
- Assess UAS Activity
 - Clear Communication
 - Initial Reports
 - Subsequent Report
 - Decision Tree
 - Assess – Opportunity
 - Assess – Opportunity, Cont.
 - Capability: Payload
 - Legal Authority
 - It's Not Actionable, but
 - Decide
 - What to do
 - When to do it
 - Summary of Actionable Steps
- Case Study
 - Levi's Stadium – Response
 - Levi's Stadium – Response, Cont.
 - Oakland Coliseum – Response
- Discussion
 - Discussion
- Summary
 - Summary

Module 8 Respond and Report UAS Activity

Duration 1.0 hour

Scope Statement

This module will introduce participants to recommended actions to investigate, deter and defeat a UAS with potential to threaten public safety. Learning will present important considerations, unintended consequences and relevant Federal authorities which must be considered when a first responder is actively integrated into a larger-scale investigation. Participants will learn concepts related to evidence preservation and collection. An overview of available federal resources is presented so first responders can successfully integrate into and actively support post-incident investigations. This module concludes with the ongoing 2017 NFL case study, reflecting on the Respond and Report TTPs, while learning how the event was resolved.

Terminal Learning Objective (TLO)

- Discuss response considerations to respond and deter unsafe, unauthorized, illegal or terrorist UAS activity
- Understand evidence collection and reporting UAS activity to appropriate agencies

Enabling Learning Objectives (ELOs)

- Identify deter and response actions available to first responders
- Discuss availability of UAS defeat technology and their limitations
- Identify UAS activity information and data collection sources
- Identify appropriate federal agencies to report UAS activity

Instructor to Participant Ratio

- 1 instructor per 50 participants

Instructional Strategy

- Instructor-led presentation

Assessment Strategy

- Observation of the level and quality of classroom participation

Practical Exercise Statement

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - Learning Objectives
 - CUAS Tactics
- Respond to UAS Activity
 - What Do We Do?
 - Respond: Investigate

- Respond: Deter
- Respond: Deter, Cont.
- Role of Law Enforcement
- Before Any CUAS Action, Consider:
- Preventing Emerging Threats Act of 2018
- Preventing Emerging Threats Act of 2018, Cont.
- Find the Operator
- UAS Incident Response and Investigation
- Report UAS Activity
 - Secure the Scene/Gather the Evidence
 - Sources of Evidence
 - Social Media
 - CUAS Data
 - Reporting Options
 - Whose Investigation is This?
 - FAA Regional Operations Center (ROC)
 - Law Enforcement Assistance Program (LEAP)
 - Potential Federal Charges
 - New UAS Provisions
 - New UAS Provisions, Cont.
- Case Study
 - Timeline of Events
 - The Suspect
 - Commercial Equipment Used
 - Video: Outcome of the NFL Leaflet Drops
 - Post Incident Analysis and Lessons Learned
- Discussion
 - Discussion
 - Discussion, Cont.
- Summary
 - Summary

Module 9 Conclusion

Duration 0.50 hours

Scope Statement

This module concludes the Counter Unmanned Aircraft Systems course. During this module, participants discuss additional training available from New Mexico Tech and complete the course post-test. The course post-test measures the exit-level knowledge of the learning objectives presented in the course; participants receive course certification after completing the post-test and all course requirements.

Terminal Learning Objective (TLO)

- N/A

Enabling Learning Objectives (ELOs)

- N/A

Instructor to Participant Ratio

- 1 instructor per 50 participants

Instructional Strategy

- Instructor-led presentation

Assessment Strategy

- Observation of the level and quality of classroom participation
- Administration of a pre-test to assess and compare entry-level to exit-level knowledge of the subject presented in the course.

Lesson Topics

- Introduction
 - Introduction
 - Course Map
 - CUAS Tactics
- Evaluation and Assessment
 - Knowledge Assessment and Evaluation
 - Knowledge Assessment: Post-Test
 - Course Evaluations
- Additional Training
 - Related Training
 - Related Training, Cont.
 - Additional Training
- Contact Information
 - Contact Information
 - Thank You

Practical Exercise Statement

- N/A

Agenda

Day 1

08:00AM-08:30AM	Module 01: Introduction
08:30AM-09:00AM	Module 02 Introduction to Unmanned Aircraft Systems (UAS)
09:00AM-09:30AM	Module 03: UAS as a Threat
09:30AM-10:15AM	Module 04: CUAS Regulations and Tactics
10:15AM-10:45AM	Module 05: Case Study Overview
10:45AM-11:45AM	Module 06: Detect and Identify UAS Activity
11:45AM-12:45PM	Break
12:45PM-01:45PM	Module 07: Track and Assess UAS Activity
01:45PM-02:45PM	Module 08: Respond and Report UAS Activity
02:45PM-03:15PM	Module 09: Conclusion