

Aircrew Training Manual
for
Small Unmanned Aircraft System



Issue Date: August 15, 2018

Version: 1.0

No part of this document may be reproduced in any written, electronic, recording, or photocopying without written permission of the City of Gaithersburg, Maryland

Introduction

This manual provides guidance for the conduct for the small unmanned aircraft system (sUAS or drone) flight operations.

The City of Gaithersburg, Maryland is dedicated to highly professional flight operations. Safety is always the first priority, and the sUAS team will be persistent in continuously demonstrating an effective program.

The sUAS program builds upon federal regulations, providing more detail and guidance when necessary to ensure the highest levels of safety. Gaithersburg recognizes compliant sUAS operations includes obeying all local, state and federal laws and regulations.

All sUAS personnel are to be familiar with this manual and are to comply with its provisions. Changes to this manual will be promptly disseminated to all sUAS personnel.

Shall vs. should vs. may vs. will — each of these implies specific requirements:

- Use of the word *shall* implies that a procedure or statement is mandatory and must be followed to comply with this standard. Since *shall* statements are requirements, they include sufficient detail needed to define compliance.
- *Should* implies recommended. *Should* statements are provided as guidance towards the overall goal of improving safety and could include only subjective statements.
- *May* implies optional at the discretion of the manufacturer, or operator. *May* statements are provided to clarify acceptability of a specific item or practice, and offer options for satisfying requirements.
- *Will* implies compliance with future, not yet realized activities or events.

Record of Manual Changes

Changes are promulgated as required by the sUAS Manager and are issued to each document holder.

Each amended page shall record the appropriate amendment number and date.

It is the responsibility of the document's holder to insert all amendments issued to him/her in a timely manner.

Record of Changes

Number	Date	Date Entered	Entered By
1.0	08/15/2018	Original Issue	Original Issue

Table of Contents

1. General Information..... 6

 1.1 Purpose..... 6

 1.2 Authority..... 6

 1.3 Administration..... 6

 1.4 State and Local Laws..... 6

 1.5 Regulatory Compliance..... 6

 1.6 Distribution of Information..... 7

2. Training..... 8

 2.1 Syllabus..... 8

 2.2 Qualification..... 8

 2.3 Qualification Hierarchy..... 8

 2.4 New sUAS..... 8

 2.5 Designation Requirements..... 8

3. Training Requirements..... 9

 3.1 Remote Pilot-in-Command (RPIC)..... 9

 3.2 Crewmember..... 9

 3.3 Instructor..... 9

 3.4 Operational (Functional) Check Flights..... 10

 3.5 Recurrent Training Curriculum..... 10

 3.6 RPIC Proficiency..... 10

 3.7 Failure to Achieve or Maintain Required Standards..... 10

 3.8 Crew Resource Management (CRM)..... 10

Enclosure 1 - Qualification Tracker..... 12

Enclosure 2 – Sample Designation Letter..... 13

Remote Pilot-in-Command Syllabus..... 14

 RPIC Training Syllabus..... 15

 RPIC Initial Training Tracker..... 16

 Recurrent Training..... 17

 New System Qualification..... 18

RPIC Lab 1: Mission Planning	19
RPIC Lab 4: Battery.....	22
RPIC Sim 1	23
RPIC Sim 3	25
RPIC Fam 1.....	26
RPIC Fam 2.....	28
RPIC Fam 3.....	29
RPIC Fam 4.....	30
RPIC Fam 5.....	32
RPIC Fam 6.....	34
RPIC Evaluation	36
<i>RPIC Evaluation Grade Sheet</i>	<i>37</i>
Crewmember Syllabus	38
<i>Crewmember Initial Training Tracker.....</i>	<i>39</i>

Produced for the City of Gaithersburg
© ASEC, Inc.
21801 N. Shangri La Drive, Suite F
Lexington Park, MD 20653
Tel: (301) 862-1732 * Fax: (301) 862-5739

1. General Information

1.1 Purpose

This document applies to all sUAS flight operations conducted by the City of Gaithersburg, Maryland (hereafter known as the “City”), including designated locations in accordance with Federal Aviation Administration (FAA) requirements. This document describes the management of sUAS aircrew training. The policies and procedures in this document are issued by the authority of the City Manager (hereafter known as “Executive”).

Unless otherwise stated, all sUAS operations described herein are based upon compliance with 14 CFR part 107. Any new authorizations or waivers shall require an update to this document and training for affected personnel before conducting those operations.

1.2 Authority

The Executive retains ultimate authority for the conduct and operation of the sUAS program, receiving strategic guidance and fiscal support from the City. This document applies to all City personnel involved in the sUAS program and those who request their services. The Executive has delegated authority to the sUAS Manager (hereafter known as “Manager”) for daily program management unless otherwise noted herein.

1.3 Administration

This manual addresses sUAS flight operations as the procedures existed when this document was drafted. Personnel, equipment, environment, and other factors change over time. A systematic approach to monitoring change is critical to ensuring this manual remains relevant. The entire document will be reviewed annually by the Manager to ensure it is current. Changes to this document must be approved by the Manager. The program is administered under these documents:

- sUAS Flight Operations Manual
- sUAS Aircrew Training Program
- sUAS Maintenance Program
- sUAS Field Guide

1.4 State and Local Laws

The City shall adhere to all applicable state and local laws and City policies pertaining to the use and operation of sUAS.

1.5 Regulatory Compliance

City personnel shall comply with FAA Regulations at Title 14 CFR Part 107, to include any special provision, exemptions, or authorizations that are issued to the City. FAA guidance in the

form of Advisory Circulars, Orders, Notices, and Bulletins will be reviewed to assist the City in remaining compliant.

1.6 Distribution of Information

The City will disseminate operational information to aircrew personnel through the use of City communications, quarterly safety/staff meetings, and memoranda. This includes items such as FAA updates, safety concerns, equipment management, and information that benefits the team.

2. Training

2.1 Syllabus

Designated City Instructors ensure safety is paramount for every flight event, and students are required to adhere to all safety protocols and conditions. All City personnel retain the right to stop training at any time, especially if a risk becomes unacceptable.

2.2 Qualification

A Qualification Tracker depicted in Enclosure (1) is used to manage qualifications. Enclosure (2) is the Designation Letter to be awarded to the individual upon successful completion of specific qualifications.

The Lead Remote Pilot (LRP) must ensure the Qualification Tracker is prepared and maintained for each Remote-Pilot-in-Command (RPIC) and crewmember. The Qualification Tracker is updated, periodically reviewed, and securely stored in an appropriate location.

2.3 Qualification Hierarchy

When designated, a RPIC also becomes a designated Visual Observer (VO) and Camera Operator (CO). All other designations are obtained separately.

2.4 New sUAS

For each new type and model sUAS, the Manager and LRP will obtain factory or contractor training for sUAS that are substantially different than current City inventory. If the new sUAS is similarly operated to existing inventory (e.g., a quadcopter), the Manager and LRP will assess manufacturer's materials to develop introductory training to qualify RPIC's on the new system.

2.5 Designation Requirements

Designation requirements for each sUAS crew position are listed in the sUAS FOM.

3. Training Requirements

3.1 Remote Pilot-in-Command (RPIC)

The RPIC training provides hands-on training to increase equipment knowledge, improve flight skills, and reinforce regulatory requirements for safe operations in the National Airspace System (NAS). Training is designed to support remote pilot operations using multirotor sUAS. To be designated, it requires accomplishing the following per the RPIC Syllabus.

- Initial qualification
 - FAA Remote Pilot with sUAS Rating (every 24 months thereafter)
 - City employee
 - Training per the enclosed RPIC Syllabus
 - Written and oral test
 - Practical evaluation
- Recurrent annual qualification
 - Crew Resource Management (CRM)
 - Practical evaluation

3.2 Crewmember

Crewmember training for Visual Observer (VO) and Camera Operator (CO) provides hands-on training to increase equipment knowledge, improve crewmember communication and coordination skills, and reinforce duties for safe operations. Training is designed to reduce risk for using multirotor sUAS. To be designated requires accomplishing the following per the Crewmember Syllabus:

- Initial qualification
 - City employee
 - Training Syllabus
- Recurrent annual qualification: CRM

There is no practical evaluation for VO's or CO's.

3.3 Instructor

There is not a prescribed syllabus to become an instructor. However, great care shall be given to designating an instructor to ensure safe training and reinforcement of high standards. Instructors shall be hand-picked based on tangible and intangible knowledge, skills, and aptitude. The following traits are considered before designating an instructor:

- Satisfaction all City RPIC requirements
- Demonstrated aptitude for teaching
- Respectful of the student-instructor relationship
- Demonstrated and sound technical knowledge
- Possession of above average flying skills

3.4 Operational (Functional) Check Flights

All designated RPICs are qualified to perform an operational flight check or return-to-service test flight to validate maintenance repairs, ensuring the results of the test flight are documented in the appropriate maintenance records.

3.5 Recurrent Training Curriculum

RPICs and crewmembers are to participate in training that occurs throughout the year to ensure timely and relevant information is shared with the entire sUAS team. Training topics are provided in the RPIC Syllabus. The LRP is responsible for coordinating recurrent training.

3.6 RPIC Proficiency

Prior to conducting missions, RPICs must have made within the previous 90 days, a minimum of three takeoffs and landings in the same sUAS category (e.g., quad copter, fixed wing, etc.).

3.7 Failure to Achieve or Maintain Required Standards

Any person who fails to achieve the performance standard during initial or recurrent training will be removed from sUAS flight duties until the performance standard is met. Failures to meet performance standard shall be noted in the individual's Qualification Tracker.

Should the competency of any person come into question, he or she shall receive remedial training to performance on the related subjects or processes. Should the person fail to achieve the performance standard during remedial training, he or she will be removed from sUAS flight duties until the performance standard is met. Failures to meet performance standard shall be noted in the individual's Qualification Tracker.

3.8 Crew Resource Management (CRM)

All RPIC and Crewmembers are trained in CRM. CRM training is conducted annually and generally covers the following items:

- Communication processes and decision behavior
 - Briefings
 - Inquiry, advocacy, and assertion
 - Crew self-critique

- Conflict resolution
- Communications and decision making
- Team building and maintenance
 - Leadership, followership, and concern for task
 - Interpersonal relationships and group climate
 - Workload management and situational awareness
 - Preparation, planning, and vigilance
 - Workload distribution and distraction avoidance
- Individual factors and stress reduction

Enclosure 1 - Qualification Tracker

sUAS Qualification Tracker					
Name (Last, First):					
Designations					
	Initial (Enter Date)	Annual Evaluation or Refresher (Enter Date)			
CRM:					
Camera Operator:					
Visual Observer:					
Remote Pilot in Command:					
Maintenance Check Pilot:					
Instructor RPIC:					
FAA Remote Pilot Certificate		Re-test every 2 years			
Qualified to Operate The Following Systems					
	Manufacture	Type	Model	Date	
				Initial	Re-currency
1					
2					
3					

Enclosure 2 – Sample Designation Letter

Date:

From: _____ (Manager)

Via: sUAS Lead Remote Pilot

sUAS Maintenance Supervisor

To: _____ (Name)

Subj: DESIGNATION AS SMALL UNMANNED AIRCRAFT SYSTEM (SUAS)
INSTRUCTOR REMOTE PILOT-IN-COMMAND / REMOTE PILOT-IN-COMMAND /
VISUAL OBSERVER / CAMERA OPERATOR / MAINTENANCE CHECK PILOT

Dear _____, (Name)

Congratulations on your successful completion of the City of Gaithersburg small unmanned aircraft system (sUAS) training syllabus. You are now designated to perform duties and operations in the category described.

The City is dedicated to highly professional flight operations. Safety will always be priority, persistent in continuously demonstrating in daily flight operations.

All staff have a responsibility to openly and honestly report aviation events and hazards.

You are expected to maintain and adhere to all applicable federal, state, and local regulations and laws, to include City policies for this designation. Any deviation or inability to satisfy these requirements should be immediately brought to the attention of the sUAS Manager.

Congratulations!

Sincerely,

sUAS Manager

Remote Pilot-in-Command Syllabus

RPIC Training Syllabus

Event	Objective	Order
Sim 1	Simulator Operation	Lab 1
	Takeoff and Landings	Sim 1
	Flight Characteristics	Sim 2
Sim 2	Flight Maneuvers	Fam 1
	Camera Manipulation	Fam 2
Sim 3	Emergency Procedures	Sim 3
	Environment	Lab 2
Fam 1	Takeoff and Landings	Lab 3
	Flight Characteristics	Lab 4
Fam 2	Basic Flight Maneuvers	Fam 3
Fam 3	Intermediate Flight Maneuvers	Fam 4
Fam 4	Takeoff and Landings	Fam 5
	Flight Characteristics	Fam 6
Fam 5	Basic Flight Maneuvers	
	Camera Manipulation	Fam: Familiarizati
	Failsafe Features	Sim: Simulator
	Operate two different multirotors	Lab: Laboratory
Fam 6	Intro to Mobile App Automation	
	Intermediate Flight Maneuvers	
Lab 1	Mission Planning	
Lab 2	Equipment	
Lab 3	Preflight	
Lab 4	Battery	

RPIC Initial Training Tracker

RPIC Initial Training Tracker		
Student Name (Last, First):		
Training Events		
Event	Completion Date (mm/DD/YY)	Instructor's Name
Sim 1		
Sim 2		
Sim 3		
Lab 1		
Lab 2		
Lab 3		
Lab 4		
Fam 1		
Fam 2		
Fam 3		
Fam 4		
Fam 5		
Fam 6		
CRM		
Eval		
Remote Pilot Certificate		
The Manager will initiate designation letter when all of the above events are complete.		

Recurrent Training

Recurrent Training
System description: aircraft, sensors/payload, control station, datalinks, and flight modes
Ground control station (GCS): familiarity, functions, indications, and warnings
Sensor and payload control: controls, recording, and functionality
sUAS system: setup, assembly, disassembly, and pack-up
sUAS safety: battery handling, charging, and storage procedures
Basic aerodynamics
FAA exemptions
Certificate of Authorizations
Company policy
Airspace: classifications, notices to airmen (NOTAMS), limitations, and weather criteria
VFR aeronautical charts
Basic weather and forecast interpretation
Visual flight rules
Checklist use
Mission planning and risk analysis
Normal operations
Payload operation
Crew resource management (CRM) and communications
Air traffic control (ATC) coordination and communications
Aeronautical decision making and judgment
Degraded and emergency procedures
See-and-avoid actions
Company standard operating procedures (SOP)
Professional behavior: privacy and data management
Maintenance
Applicable state laws

New System Qualification

New System Qualification			
Name (Last, First):		sUAS Manufacture:	
		sUAS Name:	
		sUAS Model:	
Training Events			
Event	Completion Date	sUAS	RPIC Qualified in Model - Name
Oral review with Instructor			
Reviewed Manufactures Manuals			
Conducted Fam flight with Instructor			
The Manager will initiate designation letter when all of the above events are complete.			

RPIC Lab 1: Mission Planning

Duration 0.5 hour

Equipment Classroom

Internet

Phone

Objectives Conduct airspace assessment for flight operating area
Conduct NOTAM check to verify any operational impact on flight
Review weather for operational area
Perform risk analysis

Tasks

1	Airspace	Discuss airspace sources Discuss Part 107 regulations Review airspace for outdoor flight training location
2	NOTAM	Discuss NOTAM sources and requirements Discuss Part 107 regulations Check NOTAMs for outdoor flight training location
3	Weather	Discuss weather sources Obtain weather brief for outdoor flight training
4	Risk Analysis	Conduct risk analysis for outdoor flight training
5	Logistics	Discuss crew assignments Review transportation and logistics
6	Equipment	Discuss required equipment Discuss equipment prep Review data management considerations
7	Legal / liability	Review state laws pertaining to sUAS Confirm liability coverage
8	Documents	COA and/or Part 107 authorization (if applicable) Logbook requirements for sUAS and aircrew Aircraft registration documents and markings Standard operating procedures/guidelines RPIC certificates

RPIC Lab 2: Equipment

Duration 0.5 hour

Equipment Classroom
sUAS

Support Equipment

Objectives Conduct a review of sUAS equipment
Discuss sUAS support equipment

- Tasks**
- 1 Hand controller Identify power source
Review charging process
Identify switch functions
Discuss frequency management
Discuss dual controllers (master-slave)
Review hard wire connections and purposes

 - 2 Displays Identify power source
Review charging process
Identify switches locations
Identify switch functions
Discuss frequency management
Discuss mounting options
Review hard wire connections and purposes
Review display icons and terminology

 - 3 Aircraft Identify the following and discuss function:
 - GPS
 - OSD
 - Compass
 - ESC motors
 - Propellers
 - Landing gear
 - Payload and gimbal
 - Payload data storage
 - Payload antenna
 - Aircraft command and control receiver
 - Autopilot
 - Lights

 - 4 Support Gear Discuss ancillary gear often used during operations

RPIC Lab 3: Preflight

Duration 0.5 hour
Equipment Classroom
sUAS
Checklists
Objective Conduct an sUAS preflight

- Tasks**
- | | | |
|---|---------------------------|---|
| 1 | Documents | Review manufacturers preflight checklist |
| 2 | Performance | Review aircraft performance and limitations: <ul style="list-style-type: none">• Max Takeoff Gross Weight• Max wind resistance• Max flight time• Max data link range Verify weight and balance |
| 3 | Aircraft Preflight | Perform preflight using a checklist |
| 4 | Control Station Preflight | Perform preflight |
| 5 | Weight and balance | Discuss weight and balance considerations |
| 6 | Logistics | Discuss requirements to transport equipment
Perform pack and unpacking of sUAS |

RPIC Lab 4: Battery

Duration 0.25 hour

Equipment Classroom

Battery

Battery Charger

Objectives Conduct battery charging process for LiPO battery

Conduct battery discharge process for LiPO battery

- Tasks**
- 1 Battery Review LiPO battery characteristics
 Review battery charger functions
 Identify charger wires and ports
 Discuss DJI smart batteries

 - 2 Battery Charging Review battery charging process
 Discuss when to charge batteries
 Perform battery charge procedures

 - 3 Battery discharge Review battery discharge process
 Discuss when to discharge batteries
 Perform battery discharge procedures

 - 4 Battery Test Review battery test process
 Discuss when to test batteries
 Perform battery test procedures

 - 5 Battery Safety Discuss safety considerations for storing, charging , and
 discharging
 Discuss characteristics of a damaged or malfunctioning
 battery
 Discuss procedures for battery fire
 Discuss normal battery disposal considerations

RPIC Sim 1

Duration 0.5 hour

Equipment Simulator

Objectives Introduce and practice takeoff and landings skills
Introduce and practice basic flight maneuver skills

Tasks	1	Brief	Simulator equipment familiarity Simulator hardware connections Select appropriate sUAS for training Select appropriate environment for training
	2	Hand Controller	Identify buttons and toggles on controller Review functionality for each button and toggle Discuss battery power and charging
	3	Ground	Simulate compass calibration Discuss mission planning items
	4	Takeoff	Complete Preflight checklist Perform Takeoff manually
	5	Control Check	Perform left and right yaw, roll, pitch
	6	Orientation	Conduct free flight maneuvers for several minutes
	7	Land	Perform manual landing in same location as takeoff
	8	Takeoff and landing	Perform manual takeoff, fly to max visual range, return to land Repeat 5 times with drone facing away from PIC Repeat 5 times with drone facing towards PIC
	9	Flight Maneuvers	Perform race track flight path Perform orbit around ground obstruction
	10	Land	Review landing procedures prior to final landing Shut down after final landing
	11	Debrief	

RPIC Sim 2

Duration 0.5 hour

Equipment Simulator

Objectives Practice flight skills
Introduce and practice camera manipulation skills

- Tasks**
- 1 Brief
Select appropriate sUAS for training
Select appropriate environment for training

 - 2 Takeoff
Complete Preflight checklist
Perform takeoff manually

 - 3 Camera
Manipulate camera while hovering
Change altitude while camera remains focused on vertical object

 - 4 Flight Maneuvers
Perform circle around a point of interest, clockwise
Perform circle around a point of interest, counterclockwise

Perform orbit stationary ground object while keeping pointed at the object
Follow moving ground object, keeping camera pointed at same object

 - 5 Debrief

RPIC Sim 3

Duration 0.5 hour

Equipment Simulator

Objectives Introduce and practice operating in various environment conditions
Introduce and practice contingency and emergencies situations

- Tasks**
- 1 Brief
Select appropriate sUAS for training
Select appropriate environment for training

 - 2 Takeoff
Complete Preflight checklist
Perform takeoff manually

 - 3 Environment
Perform multiple takeoff and landings in high winds
Perform multiple takeoff and landings at night
Perform flight maneuvers in high turbulence environment

Perform flight maneuvers in low visibility conditions

 - 4 Emergencies
Practice engine loss
Perform loss link procedures
Perform fly-away procedures
Perform emergency landing procedures
Perform loss of visual contact procedures
Perform emergency yield procedures
Perform flight termination procedures

 - 5 Debrief

RPIC Fam 1

Duration 0.25 hour

Equipment Flight operations inside a building
 sUAS multirotor
 Control station

Objectives Practice takeoff and landings skill (non GPS)
 Introduce and practice multirotor flight skills (non GPS)

Tasks	1	Brief	Review sUAS equipment Review indoor flight facility and safety considerations Discuss vortex ring state
	2	Hand Controller	Identify buttons and toggles on controller Review functionality for each Discuss battery power Discuss charging
	3	Aircraft	Discuss lighting indications Discuss flight characteristics in non-GPS
	4	Takeoff	Simulate compass calibration Complete Preflight checklist Perform takeoff
	5	Control Check	Perform left and right yaw Perform left and right roll Perform fore and aft pitch Perform elevation up and down
	6	Controlled Hover	Hover with drone facing away for 1 minute Hover with drone facing left for 1 minute Hover with drone facing right for 1 minute Hover with drone facing towards for 1 minute
	7	Orientation	Conduct free flight maneuvers for 1 minute
	8	Land	Perform manual landing in same location as takeoff

Tasks

- (continued)**
- | | | |
|----|-------------------------------|---|
| 9 | Multiple takeoff and landings | Perform manual takeoff, fly to max distance, return to land
Repeat 2 times with drone facing away from PIC
Repeat 2 times with drone facing towards PIC
Review landing procedures prior to final landing |
| 10 | Flight Maneuvers | Takeoff and perform clockwise race track flight path
Perform counterclockwise race track flight path |
| 11 | Land | Review landing procedures prior to final landing
Shut down after final landing |
| 12 | Debrief | |

RPIC Fam 2

Duration 0.25 hour

Equipment Flight operations inside a building
sUAS multirotor
Control station

Objective Practice basic flight maneuvers skills (non GPS)

- Tasks**
- 1 Brief Discuss flight maneuvers

 - 2 Takeoff Simulate compass calibration
 Complete Preflight checklist
 Perform takeoff

 - 3 Flight Maneuvers Perform circle around a point of interest, clockwise
 Perform circle around a point of interest, counterclockwise

 Perform orbit stationary ground object while pointed nose
 forward at the object
 Follow moving ground object, while pointed at same object

 Increase and decrease altitude in close proximity to wall

 - 4 Land Review landing procedures prior to final landing
 Shut down after final landing

 - 5 Debrief

RPIC Fam 3

Duration 0.5 hour

Equipment Flight operations inside a building
sUAS multirotor
Control station

Objective Practice intermediate flight maneuvers skills (non GPS)

- | | | |
|--------------|------------------------|---|
| Tasks | 1 Brief | Discuss flight maneuvers |
| | 2 Takeoff | Simulate compass calibration
Complete Preflight checklist
Perform takeoff |
| | 3 Flight Maneuvers | Maneuver aircraft through obstacle course |
| | 4 Emergency Procedures | Loss Link

Loss of visual contact
Fly-away
Emergency yield |
| | 5 Land | Review landing procedures prior to final landing
Shut down after final landing |
| | 6 Debrief | |

RPIC Fam 4

Duration 0.5 hour

Equipment Outside
sUAS multirotor
Control station

Objectives Introduce and practice takeoff and landing skills
Introduce GPS assisted flight characteristics

Tasks	1	Brief	Review sUAS equipment Review outdoor venue and safety considerations Discuss vortex ring state
	2	Hand Controller	Identify buttons and toggles on controller Review functionality for each Discuss battery power Discuss charging
	3	Aircraft	Discuss lighting indications Discuss display indications Discuss flight characteristics with GPS
	4	Preflight	Perform sUAS inspection Review Safety Brief
	5	Takeoff	Complete Preflight checklist Perform takeoff
	6	Control Check	Perform left and right yaw Perform left and right roll Perform fore and aft pitch Perform elevation up and down
	7	Controlled Hover	Hover with drone facing away for 1 minute Hover with drone facing left for 1 minute Hover with drone facing right for 1 minute Hover with drone facing towards for 1 minute Change flight modes, repeat
	8	Land	Perform manual landing in same location as takeoff

Tasks (continued)	9	Heading	Maneuver to assigned heading Turn the nose of the aircraft to assigned heading Turn the nose of the aircraft to relative direction (left 90 degrees)
	10	Takeoff and Landing	Perform manual takeoff, fly 100 feet horizontally, return to land Repeat with drone facing away from PIC Repeat with drone facing towards PIC
	11	Flight Maneuvers	Perform clockwise race track flight path in relation to ground reference points Perform counterclockwise race track flight path in reference to ground reference points
	12	Position	While flying, discuss positional information using GPS or other available navigational tools Navigate the aircraft to a point location using any and all available navigational tools
	13	Emergency Procedures	Practice loss link procedure Practice loss of visual contact procedure
	14	Land	Review landing procedures prior to final landing Shut down after final landing
	15	Debrief	

RPIC Fam 5

Duration 0.5 hour

Equipment Outside
Two different sUAS multirotors
Control station

Objectives Practice basic flight maneuver skills
Introduce and practice fail safe features
Practice camera manipulation while flying skills
Operate two different sUAS multirotors

Tasks	1	Brief	Review any changes to equipment, weather or any factor that changes risk or hazards
	2	New sUAS	Identify buttons and toggles on controller for sUAS being introduced Review functionality for each Discuss battery power Discuss lighting indications Discuss display indications Discuss CRM while using camera Discuss hazards and risk mitigation
	3	Camera Manipulation	Discuss camera controls Review standard phraseology for communication between crew members Discuss sterile cockpit
	4	Preflight	Perform sUAS inspection Review Safety Brief
	5	Takeoff	Complete Preflight checklist Perform takeoff, fly to 500 feet waypoint
	6	Return to Home	Confirm parameters, perform RTH Assume manual control, reset 100 feet away, repeat
	7	Instrument Maneuvers	Climb 100 feet while maintaining forward flight using only cues from the GCS

**Tasks
(continued)**

- Utilize a VO to maintain line of sight while the pilot is heads down using GCS displays
Turn to a specified heading while maintaining forward flight using only cues from the GCS
Descend 100 feet while maintaining forward flight using only cues from the GCS
- 8 Emergency Procedures Practice fly-away procedure
 Practice emergency yield procedure
- 9 Data Collection Perform orbit stationary ground object, imaging object
 Follow moving ground object, imaging object
 Increase and decrease altitude in close proximity while imaging vertical object
- 10 Land Review landing procedures prior to final landing
 Shut down after final landing
- 11 Data management Review image collection results
- 12 Debrief

RPIC Fam 6

Duration 0.5 hour

Equipment Outside
 sUAS multirotors
 Control station
 Mobile device with app loaded

Objectives Introduce mobile app automation features
 Practice intermediate flight maneuver skills

Tasks	1	Brief	Review any changes to equipment, weather or any factor that changes risk or hazards
	2	New sUAS	Identify buttons and toggles on controller for sUAS being introduced Review functionality for each Discuss battery power Discuss lighting indications Discuss display indications Discuss CRM while using camera Discuss hazards and risk mitigation
	3	Automation	Discuss autopilot and automation features Explain how to recognize the current mode Explain how to recognize anticipated and unanticipated mode or status changes State at any time during the flight the current mode or status and the next anticipated mode or status Recognize unanticipated mode changes in a timely manner and return the autopilot to correct mode
	3	Camera Manipulation	Discuss camera controls Discuss automation with camera
	4	Preflight	Perform sUAS inspection Review Safety Brief
	5	Auto Takeoff	Complete Preflight checklist Perform takeoff

Tasks (continued)	6	Auto Flight 1	Using mobile app, perform auto flight, land
	7	Auto Flight 2	Using mobile app, perform auto flight, land
	11	Flight Maneuvers	Free flight
	12	System Malfunction	Loss of telemetry
	13	Land	Review landing procedures prior to final landing Shut down after final landing
	14	Debrief	

RPIC Evaluation

Duration 0.5 hour

Equipment Outside
sUAS multirotors
Control station

Objectives Mobile device with app loaded
Evaluate RPIC using Grade Sheet

Tasks 1 Mission Instructors observe student conduct a complete mission

2 Debrief

RPIC Evaluation Grade Sheet

RPIC Evaluation									
Last name, first name				sUAS Type/Model			Date		
Use for Initial and Recurrent PIC Evaluations									
Discuss				Comp		Perform Emergency Procedures			
Written Test						Fly-away		Pass	Fail
Oral Test						GPS Failure		Pass	Fail
Records Review						Lost Link		Pass	Fail
Company policy						Lost communication		Pass	Fail
Logs								Pass	Fail
Operating limitations and restrictions								Pass	Fail
Emergency procedures				Perform Approaches and Landings					
Privacy and data management						Visual manual approach		Pass	Fail
Perform Normal Procedures						Autotmated landings		Pass	Fail
Mission Planning		Pass	Fail			Manual landings		Pass	Fail
System setup		Pass	Fail			Go-around		Pass	Fail
Preflight procedures		Pass	Fail					Pass	Fail
Engine-start procedures		Pass	Fail					Pass	Fail
Takeoff procedures		Pass	Fail	General					
Departure procedures		Pass	Fail			State operating limits		Pass	Fail
Climb procedures		Pass	Fail			Execute checklist procedures		Pass	Fail
Waypoint navigation functions		Pass	Fail			Perform crew duties		Pass	Fail
Automatic flight mode		Pass	Fail			Perform automation management		Pass	Fail
Manual flight mode		Pass	Fail			Maintain basic airwork		Pass	Fail
Datalink management		Pass	Fail			Utilize controller		Pass	Fail
Power management		Pass	Fail			Utilize GPS		Pass	Fail
Sensor control		Pass	Fail			Demonstrate CRM skills		Pass	Fail
Descent procedures		Pass	Fail			Demonstrate headwork		Pass	Fail
Approach procedures		Pass	Fail			System knowledge		Pass	Fail
After-landing procedures		Pass	Fail	Overall					
Secure procedures		Pass	Fail					Pass	Fail
Instructor Remarks									
Instructor name				Instructor signature / date					
Evaluatee name				Evaluatee signature / date					

Crewmember Syllabus

Crewmember Initial Training Tracker

Crewmember Initial Training Tracker		
Student Name (Last, First):		
Training Events		
Event	Completion Date (mm/DD/YY)	Instructor's Name
CRM		
Participate as VO or CO under training during sUAS flight		
The Manager will initiate designation letter when all of the above events are complete.		