Civil Aviation Authority of Singapore

Advisory Circular

APPROVALS FOR UNMANNED AIRCRAFT TRAINING

GENERAL

Advisory Circulars (ACs) are issued by the Director-General of Civil Aviation (DGCA) from time to time to provide practical guidance or certainty in respect of the statutory requirements for aviation safety. ACs contain information about standards, practices and procedures acceptable to CAAS. An AC may be used, in accordance with section 3C of the Air Navigation Act (Cap. 6) (ANA), to show that compliance with a statutory requirement has been achieved. The revision number of the AC is indicated in parenthesis in the suffix of the AC number.

PURPOSE

This AC provides guidance relating to an organisation seeking approvals to conduct unmanned aircraft (UA) basic training, UA pilot licence training or practical assessments / proficiency checks pursuant to the Air Navigation (101 – Unmanned Aircraft Operations) Regulations 2019 (“ANR-101”).

APPLICABILITY
This AC is applicable to an organisation seeking approval or have been approved to conduct UA basic training, UA pilot licence training or practical assessments / proficiency checks pursuant to ANR-101.

RELATED REGULATIONS
This AC relates specifically to Part 3 of the ANR-101.

RELATED ADVISORY CIRCULARS
Nil.

CANCELLATION
This AC is the first on the subject.

EFFECTIVE DATE
This AC is effective from 18 May 2020.

OTHER REFERENCES
Nil.

1 INTRODUCTION

1.1 Pursuant to the ANR-101, a person must not provide UA basic training (UABT) unless that person holds a UABT approval. A person must also not provide any UA pilot licence (UAPL) training or conduct any practical assessment or proficiency check, unless that person holds an Unmanned Aircraft Training and Assessment Organisation (UATO) approval.

1.2 The UABT is mandatory for UA users operating a UA with a total mass exceeding 1.5kg but not exceeding 7kg for recreation or education purpose. UABT provides the UA user with the relevant knowledge to operate their UA safely and responsibly.

1.3 The UAPL is mandatory for UA users operating a UA for non-recreation or non-education purposes or a UA with a total mass exceeding 7kg for all purposes. UAPL ensures that users have the necessary competency to operate the UAs safely.

UA BASIC TRAINING ORGANISATION (UABTO)

2 COMPONENTS OF UA BASIC TRAINING (UABT)

2.1 The UABT should be administered as an online course. The UABTO should ensure that online UABT include, but not limited to, the following components:

(a) Means to secure user registration and login that is compliant to the Personal Data Protection Act (PDPA) (Refer to **Appendix 1**);

(b) Courseware (Refer to **Appendix 2**);

(c) A randomly generated 20 questions picked from a question bank that consist of at least 50 questions and corresponds with the module referenced in Appendix 2, to be administered at the end of the course.

(d) The quiz will only be considered completed when all 20 questions are correctly answered; and
   (i) if a user answers a question incorrectly, a different question from the corresponding module in the question bank is generated; and
   (ii) all questions from the question bank must be exhausted before recycling the same question.

(e) Means to provide trainees with a Certificate of Completion after successful completion of the quiz. The certificate should include the trainee's full name as per the NRIC (or other equivalent ID such as the passport), course title, date of completion of the UABT, name of UABTO, UABTO's Accountable Manager's signature and reference/serial number.

3 APPLICATION FOR UABT APPROVAL

3.1 An applicant should make an application for a UABT approval through the eSOMS (https://esoms.caas.gov.sg) at least 2 months before the intended date of commencement of the applicant's training operations and accompanied by the relevant application fee. Refer to **Appendix 6**.

3.2 The applicant is required to submit the following information as part of the application:

(a) Organisation details
    (i) Name of the organisation
    (ii) Address of the organisation
    (iii) ACRA BizFile

(b) CV of Accountable Manager (AM)

(c) Description of the overall system architecture for the online system

(d) Details of courseware

(e) Question bank that consist a minimum of 50 questions

(f) Template of Certificate of Completion

(g) Details on means to retain records of trainees

3.3 The AM is normally the chief executive officer (CEO) who by virtue of position has overall (including in particular financial) responsibility to run the organisation. If the AM is not the CEO, he/she should have the overall responsibility to run the organisation and have direct access to the CEO.

3.4 The AM is responsible to:
(a) ensure that the UABTO complies with the regulatory requirements set by CAAS; and
(b) ensure that sufficient funding is available to conduct activities to the approved standard.

4 RECORDS

4.1 The UABTO has to maintain detailed records of the following for the specified retention period:

Records	**Minimum Retention period**
• Trainee's name, date of birth, contact address, contact number, email address and unique identifier (e.g. last 4 digits of NRIC/Passport) • Time and date of which trainee completed the training	Five years after the trainee has completed the UABT

4.2 The UABTO should ensure that;
(a) the integrity of records is maintained;
(b) the records are not deleted or altered; and
(c) there is a backup system of the records to provide continuity.

4.3 The UABTO should provide CAAS with records minimally on a weekly basis or when required by CAAS.

5 APPLICATION FOR UATO APPROVAL

5.1 An applicant should make an application for a UATO approval through eSOMS (https://esoms.caas.gov.sg) at least 2 months before the intended date of commencement of the applicant's training operations and accompanied by the prescribed application fee. Refer to **Appendix 6**.

5.2 The applicant is required to submit the following information as part of the application:

(a) Organisation details
  (i) Name of the organisation
  (ii) Address of the organisation
  (iii) ACRA BizFile

(b) Key personnel
  (i) CV of Accountable Manager
  (ii) CV of Head of Training
  (iii) CV of Quality Manager

(c) List of instructors

(d) List of nominated authorised flight examiners (UA) ("AFE(UA)")

(e) Description of facilities and equipment to conduct UAPL training

(f) Organisational manuals
  (i) Operations Manual
  (ii) Training Manual
  (iii) Quality Manual

(g) Description of the quality assurance system

(h) Description of the document control and distribution system

(i) Records-keeping system for:
  (i) Trainees
  (ii) Staff

5.3 The UATO is required to demonstrate to CAAS that it has adequate staff, equipment, and infrastructure (e.g. sufficient classrooms and UA) to conduct UA flight training, practical assessment and proficiency checks. CAAS may conduct on-site inspections of the UATO's facilities to ascertain these aspects.

5.4 The UATO is not required to obtain an Operator Permit or a Class 1 Activity Permit to conduct practical training, assessments and proficiency checks which involves the flying of a UA. However, a Class 2 Activity Permit will be required if the UATO intends to fly the UA outdoors under any of the following conditions:

(a) Altitude exceeding 200 feet above mean sea level (AMSL);
(b) Within 5 kilometres of any aerodrome; or
(c) Within any restricted area, danger area or protected area, as published in the Government Gazette.

Note: The restricted areas, danger areas, protected areas and areas within 5 kilometres of an aerodrome are shown on the OneMap portal (www.onemap.sg).

6 KEY PERSONNEL

6.1 The UATO should employ fit and proper individuals for the following key roles:
(a) Accountable Manager (AM)
(b) Head of Training (HT)
(c) Quality Manager (QM)

6.2 The AM is normally the chief executive officer (CEO) who by virtue of position has overall (including in particular financial) responsibility to run the organisation. If the AM is not the CEO, he/she should have the overall responsibility to run the organisation and have direct access to the CEO.

6.3 The AM is responsible to:
(a) ensure that the UATO complies with the regulatory requirements set by CAAS;
(b) ensure that sufficient funding is available to conduct activities to the approved standard; and
(c) nominating the other key personnel and AFE(UA).

6.4 The HT must have direct access to the AM and meet the following requirements:
(a) Hold a valid UAPL relevant to the scope of approval after 1 February 2021; and
(b) Is an instructor within the UATO.

6.5 The HT is responsible to:
(a) ensure satisfactory training as well as supervising the progress of individual trainees;
(b) ensure instructors meet the required standards and performance;
(c) ensure AFE(UA) maintains recency and adheres to the assessment standards required by CAAS ; and
(d) ensure sufficient resources are available to perform the activities under the scope of approval granted to the UATO.

6.6 The QM must have direct access to the AM and meet the following requirements:
(a) At least 2 years' relevant experience in quality assurance; or
(b) Attended a quality assurance course acceptable to CAAS.

6.7 The QM is responsible for ensuring that the quality assurance system as mentioned in paragraph 11 is properly implemented, maintained, continuously reviewed and improved.

7 INSTRUCTORS

7.1 Instructors employed by the UATO have to meet the following requirements;
(a) Holds a valid UAPL relevant to the scope of approval after 1 February 2021;
(b) Competent to instruct; and
(c) Passed competency check conducted by CAAS or the AFE(UA).

8 AUTHORISED FLIGHT EXAMINER (UA)

8.1 The UATO will nominate a person to be authorised by CAAS as an AFE(UA). Upon authorisation by CAAS, the AFE(UA) will be responsible for the administration of practical assessment and proficiency checks on behalf of CAAS. The period of AFE(UA) authorisation is up to 24 months.

8.2 To qualify for initial authorisation, the AFE(UA) nominee has to meet the following requirements;

(a) At least 1 year of experience as an instructor;
(b) Holds a valid UAPL relevant to the scope of approval after 1 February 2021;
(c) At least 21 years old;
(d) Attended induction briefing by CAAS; and
(e) Passed practical evaluation by CAAS.

8.3 To qualify for reauthorisation, the AFE(UA) has to meet the following requirements;

(a) Holds a valid UAPL relevant to the scope of approval;
(b) Maintains recency with:
    (i) at least 12 practical assessments or proficiency checks during the validity of the existing authorisation; and
    (ii) at least 2 practical assessments or proficiency checks within each 6-month period during the validity of the existing authorisation;
(c) Successfully completed an internal refresher training programme approved by CAAS, not earlier than 6 months before the date of expiry of the existing AFE(UA) authorisation; and
(d) Passed practical evaluation by CAAS.

9 FACILITIES AND EQUIPMENT

9.1 The UATO should be sufficiently equipped to enable adequate conduct of theory and practical training that is appropriate to the size and scope of the intended operations. These include the following:

(a) Classroom(s) for theory training;
(b) Adequate location(s) for practical training and assessment;
(c) Sufficient UA types for practical training relevant to the approval with varying stability augmentation for purpose of training;
(d) Course materials;
(e) Instructor / AFE(UA) guides;
(f) Flight simulators (if any); and
(g) Facilities to enable the following to be carried out adequately:
    (i) Administrative functions;
    (ii) Course development;
    (iii) Maintenance of equipment; and
    (iv) Records-keeping.

10 ORGANISATIONAL MANUALS

10.1 The UATO must provide and maintain the manuals containing guidance on the policies, processes and procedures for the personnel concerned, to enable them to adequately discharge their duties in providing training and assessment.

10.2 The manuals must include, but not limited to the following:
(a) Operations Manual;
(b) Training Manual; and
(c) Quality Manual.

10.3 The Training Manual should define the detailed course syllabi to achieve the competency required for the UAPL. It should also state the learning objectives and standards to be met for each phase of training before the trainee progress to the next phase of training. Refer to **Appendix 3 and 4** for UAPL learning outcomes.

10.4 The UATO should review and validate the manuals at least once a year. The review and validation should include the critical aspects of the information contained in the manuals to verify its clarity, implementations, effectiveness, accuracy and relevance. The review should minimally take into account the following:
(a) Changes in the organisation's policies, procedures and practices;
(b) Changes to the content of training programmes;
(c) Changes resulting from new facilities and equipment;
(d) Changes to an approval document; and
(e) Changes to relevant regulations.

10.6 Details on the contents of Operations Manual and Training Manual can be found on **Appendix 5**.

11 QUALITY ASSURANCE SYSTEM

11.1 The UATO should establish a quality assurance system that includes:
(a) an independent audit function to monitor training and evaluation standards, the integrity of practical assessments and proficiency checks, and compliance with the procedures; and
(b) a feedback system of audit findings to the person(s) and ultimately to the accountable manager to ensure, as necessary, timely implementation of effective corrective and preventive action.

11.2 The quality assurance system should ensure conformance to standards and procedures, adequacy of training and assessment activities conducted as described in the respective manuals. Every process that assists the UATO to achieve its results shall be identified and the activities and procedures documented. The UATO should specify the basic structure of the quality assurance system applicable to all training and assessment activities conducted.

11.3 The quality assurance system should be documented in a Quality Manual that is regularly kept updated which includes, as a minimum, the following elements:
(a) Responsibilities of personnel;
(b) System to ensure conformance of training with the training standards;
(c) System for identifying deviations from policy and standards and taking corrective actions; and
(d) Evaluation and analysis of experiences and trends concerning training standards, in order to provide feedback into the system for the continual improvement of the quality of training.

12 DOCUMENT CONTROL AND DISTRIBUTION SYSTEM

12.1 The UATO should have a system in place for the review and endorsement of changes and revision control to the respective manuals. In addition, the system must ensure effective distribution of the revised manuals to all its personnel so that the latest versions are used at all times.

12.2 Amendments made to the manuals have to be submitted to eSOMS (https://esoms.caas.gov.sg) for acceptance. The UATO should only implement the provisions contained within the revised manuals only after the amendments have been accepted by CAAS.

13 RECORDS

13.1 The UATO must maintain detailed records of the following for the specified retention period:

Records	**Minimum Retention period**
Trainee training, evaluation, practical assessment and proficiency check	Five years after the training or assessment has been completed
Qualifications, training and evaluation of instructors and AFE(UA)	Five years after instructor or AFE(UA) has relinquished his role in UATO
Changes to key personnel	Five years after the change

13.2 The UATO has to ensure that:

(a) the records are complete such that there will be sufficient documentary evidence of each training action and for the reconstruction of the training history of each trainee, instructor or AFE(UA) in the organisation;

(b) the integrity of records is maintained by ensuring that the records are not removed or altered without authorisation; and

(c) there is a backup system of the records to provide continuity.

13.3 The UATO has to maintain a personal record for every trainee, instructor and AFE(UA). The records should include:

(a) Personal particulars;

(b) A copy of UAPL if applicable; and

(c) Detailed records of

(i) Qualifications, training and evaluation for instructor and AFE(UA);

(ii) Training and evaluation for trainees; and

(iii) The results of practical assessment and proficiency checks as required by CAAS.

GENERAL REQUIREMENTS

14 VALIDITY OF APPROVAL

14.1 The UABTO approval and UATO approval will be valid for up to 1 year.

15 RENEWAL OF APPROVAL

15.1 An application for renewal of the approval is to be made on the eSOMS (https://esoms.caas.gov.sg) at least 2 months before expiry of the approval and accompanied by the prescribed application fee. Refer to **Appendix 6**.

16 VARIATION OF APPROVAL

16.1 The approved training organisation has to notify CAAS of any variation that is significant to the operations of the UATO. These may include:

(a) changes in key personnel;
(b) changes in scope of training;
(c) inclusion of new training courses; or
(d) location of the facilities.

16.2 An application for variation of the approval is to be made on the eSOMS (https://esoms.caas.gov.sg) and accompanied by the prescribed application fee. Approval by CAAS is required before the organisation can proceed with implementation of the change.

17 TRANSFERABILITY

17.1 A UABTO or UATO granted to an organisation is not transferrable except as a result of a change in ownership. A change of ownership is considered a significant change and necessitates submission of a variation to CAAS. A new application is required in the event of a unique entity number (UEN) change.

APPENDIX 1 UABT SYSTEM SECURITY REQUIREMENTS

The design of the UABT should include robust security controls and measures to ensure the reliability and privacy of the system and the data that is stored, processed or accessed by the system.

The UABTO should fully comply with the Personal Data Protection Act (PDPA) for the collection, use and disclosure of personal data and notify CAAS upon detection of any confirmed IT security incident or security breach affecting the system or its data, and provide CAAS with any follow-up actions to be taken.

Reference on security best practices can be found on the CSA Go Safe for Business website (https://www.csa.gov.sg/gosafeonline/go-safe-for-business/smes).

APPENDIX 2 UABT LEARNING OUTCOMES

The UA basic training consists of 3 modules;

1. Air Law & Legislations
2. UAS General Knowledge
3. UAS Safety & Operations

AIR LAW & LEGISLATIONS		
Learning Objective		To equip the trainee with relevant knowledge of the Air Navigation Act (ANA), ANR-101 and other associated advisory circulars for the safe and responsible operation of UA.
Knowledge Areas	**1.1**	Regulations applicable to different UA operations (recreation, education and non-recreation / non-education purposes).
	1.2	Permits required for different UA operations and where to apply for the permits.
	1.3	UA registration and how to apply for registration
	1.4	UAPL and its associated classes, categories and ratings; and how to apply for UAPL
	1.5	User operating guidelines (Do's & Don'ts)
	1.6	"No-fly" zones with the use of onemap.sg
	1.7	Penalties upon contravening provisions of the ANA and ANR-101

UAS GENERAL KNOWLEDGE		
Learning Objective		To equip the trainee with basic aeronautical and technical knowledge of UA including the functionality of various UAS components and systems.
Knowledge Areas	**2.1**	Different categories of UA (e.g. Aeroplane, Rotorcraft, Powered-lift, Airship, etc.)
	2.2	Different forces acting on an UA during manoeuvres and steady flight
	2.3	Components of different categories of UA, and its functionality
	2.4	Critical systems of different categories of UA, and how the systems interact with each other.
	2.5	The common flight control modes of the UA (e.g. position hold, attitude hold, manual, way-point navigation etc.)
	2.6	Common radio-control (RC) modes (Mode 1, 2, 3 & 4)
	2.7	Critical specifications of UAS and their implication on performance
	2.8	Where to find the critical specifications of the UAS

UAS SAFETY & OPERATIONS		
Learning Objective		To equip the trainee with the necessary knowledge to ensure safe UAS operation. including required procedures and safeguards; and human performance affecting safe UA operations.
Knowledge Areas	**3.1**	Conducting flight checks (pre-flight, in-flight & post flight) and the best practices to conduct such flight checks
	3.2	Identifying hazards affecting UAS operation and how to mitigate potential risks (e.g. environment, weather, etc.)
	3.3	Different emergencies (e.g. low battery, loss of GPS, loss of command link etc.) and its recovery procedures
	3.4	Conducting periodic UAS maintenance and the best practices to conduct such inspections, maintenance and repair
	3.5	Safety issues of non-commercial off-the shelf UAS and how to mitigate them.
	3.6	Physiological factors affecting operator's performance in ensuring safe UA operations. (e.g. alcohol, sickness, fatigue, etc.)
	3.7	Psychological factors affecting UA performance (e.g. lack of flying experience, lack of carefulness and sense of responsibility, etc.)
	3.8	Correct scanning techniques when operating UA
	3.9	Visual illusions and sun blindness and its preventive actions

APPENDIX 3 UAPL THEORY KNOWLEDGE LEARNING OUTCOMES

The following table shows the knowledge areas, number of questions and duration of the theory test.

Subject Name	Duration	Number of Questions	Passing Mark
General UAS Knowledge	1.5 hrs	50	75%
Principles of Flight			
Air Law			
Navigation and Meteorology			
Human Factors			
Safety and Operations			

The following table shows the recommended syllabus to develop training materials.

Recommended Study Guides
1. Air Navigation Act (ANA) 2. Air Navigation (101 – Unmanned Aircraft Operations) Regulations 3. The Complete Remote Pilot – ASA 4. Remote Pilot Test Prep 2019 – ASA 5. The Droner's Manual – ASA

Syllabus Reference	Learning Outcome
010 00 00	**General UAS Knowledge**
010 01 00	**Introduction to UAS**
010 01 01	Define what is an Unmanned Aircraft System (UAS) and Unmanned Aircraft (UA)
010 01 02	Describe the different categories of UA and its operating principles - Aeroplane - Rotorcraft • Multi-rotor • Helicopter - Powered-Lift - Airship
010 01 03	Explain the various applications of UAS (e.g. aerial photography/videography, surveillance, etc.)
010 02 00	**UAS Components and Systems**
010 02 01	Identify UAS components of different categories and describe its functions
010 02 02	Describe major systems of UAS and how the systems are integrated with each other - Power and Electrical System - Propulsion System - Flight Control and Navigation System - Command and Control (C2) System - Ground Control System
010 02 03	Describe how to recognize and/or identify failed/damaged components (e.g. failed servo, propeller damage, etc.)
010 02 04	Understand the importance of following original equipment manufacturer (OEM) guidelines when repairing UAS
010 03 00	**UAS C2**
010 03 01	Describe the operation of the UAS C2 link - The transmitter module - The receiver module
010 03 02	Understand the importance of radio-line-of-sight
010 03 03	Identify the causes of radio interference and loss link

Syllabus Reference	Learning Objectives
020 00 00	**Principles of Flight**
020 01 00	**Aerodynamics**
020 01 01	Identify the four forces of flight - Lift - Weight - Thrust - Drag
020 01 02	Describe the aerofoil interaction with airflow - Lift generation / aerodynamic force - Angle of attack (AOA) - Ground effect
020 01 03	Describe aerodynamic stall and spin - Causes of stalls - Symptoms of stalls - Stages of spins - Basic stall/spin recovery
020 01 04	Describe aerodynamic stability - Static stability - Dynamic stability
020 02 00	**Control of Motion (Aeroplane / Rotorcraft / Powered-lift / Airship)**
020 02 01	List the axes of motion - Lateral axis (pitch) - Longitudinal axis (roll) - Vertical axis (yaw)
020 02 02	Describe the function of the main control surfaces - Ailerons - Elevator - Rudder
020 02 03	Understand the function of trim

Syllabus Reference	Learning Objectives
030 00 00	**Air Law**
030 01 00	**Air Navigation Act (ANA)**
030 01 01	Know the provisions stated in the ANA. Included but not limited to; - Dangerous activity involving aircraft - Flying without satisfying safety requirements - Trespassing at aerodromes - Penalty for dangerous flying
030 02 00	**Air Navigation (101 – Unmanned Aircraft Operations) Regulations**
030 02 01	Know the provisions stated in the ANR101
030 02 02	Explain the regulations applicable to different UAS operations (recreation, education and non-recreation / non-education purposes)
030 03 00	**Airspace**
030 03 01	List “no-fly” zones using onemap.sg
030 03 02	List locations that require permits to fly (onemap.sg)
030 03 03	State altitude restrictions for UAS operations
030 04 00	**UA Registration**
030 04 01	State who requires UA Registration
030 04 02	Understand the UA Registration process
030 05 00	**Permits**
030 05 01	State who requires an Operator Permit, Class 1 Activity Permit, Class 2 Activity Permit and other permits.
030 05 01	Know the UA Operator Permit conditions
030 05 02	Understand the permit application process
030 06 00	**Unmanned Aircraft Pilot Licence (UAPL)**
030 06 01	State the associated UAPL classes, categories and ratings
030 06 02	State the requirements for the issuance and maintenance of an UAPL
030 06 03	State the privileges of an UAPL
030 07 00	**UA Basic Training**
030 07 01	State who requires UA Basic Training
030 08 00	**Penalties**
030 08 01	State the penalties upon contravening provisions relating to UA operations of the ANA and ANR-101

Syllabus Reference	Learning Objectives
040 00 00	**Navigation & Meteorology**
040 01 00	**Navigation**
040 01 01	Describe the geographic coordinate system used in basic navigation - UTM map projection - Latitude and longitude
040 01 02	State and explain the means of navigation for UA - Global Positioning System (GPS) - Global Orbiting Navigation Satellite System (GLONASS) - Ground based navigation systems • Local area differential GNSS (WADGNSS) • Classical DGNSS • Real Time Kinematics (RTK) • Wide Area Kinematics (WARTK) - Factors affecting accuracy of satellite navigation systems - Basic principles of operation and common errors
040 01 03	Describe other forms of guidance systems, their operating principles and pros/cons - Infra-red (IR) system - Vision-based system - Ultrasound system - Light Detection and Ranging (LIDAR) system
040 02 00	**Meteorology**
040 02 01	State atmospheric properties and their effects on UA performance - Pressure - Temperature - Density - Humidity
040 02 02	Define basic altimetry terms - Height - Elevation - Altitude - Mean Sea Level (MSL) - Above Mean Sea Level (AMSL) - Above Ground Level (AGL)
040 02 03	Identify cloud types and their impact on UAS operations - Cumulus (CU) - Cumulonimbus (CB)
040 02 04	Identify different types of winds and their impact on UA during operations - Headwind - Tailwind - Crosswind
040 02 05	Describe how to obtain and interpret reliable weather information - Meteorological Services Singapore (non-aviation) - METAR (aviation) - Aeronautical weather charts/reports

Syllabus Reference	Learning Objectives
050 00 00	**Human Factors**
050 01 00	**Physiology – Vision**
050 01 01	Describe correct visual scanning techniques
050 01 02	Identify visual illusions during UAS operations and how to overcome them - Disorientation - Spatial Disorientation
050 02 00	**Physiology – Medications**
050 02 01	Describe the effects of medications during UAS operations
050 03 00	**Physiology – Psychoactive Substances**
050 03 01	Know the prohibition of use of psychoactive substances during UAS operations
050 03 02	Describe the effects of intoxication during UAS operations
050 03 03	State the penalty on operating an UA under the influence of any psychoactive substances
050 04 00	**Psychology – Fatigue**
050 04 01	Identify the causes of fatigue
050 04 02	Describe the effects of fatigue on UAS operations
050 04 03	Describe fatigue management techniques
050 05 00	**Psychology – Stress**
050 05 01	Identify the causes of stress
050 05 02	Describe the effects of stress on UAS operations
050 05 03	Describe stress management techniques

Syllabus Reference	Learning Objectives
060 00 00	**Safety & Operations**
060 01 00	**Situational Awareness**
060 01 01	Describe the importance of situational awareness - Maintaining situational awareness - Assessing situations and making decisions - Task prioritization and management
060 02 00	**Operational Risks and Hazards**
060 02 01	Define risk and hazard
060 02 02	Identify common UAS operational risks and hazards
060 02 03	Apply the general steps to perform risk assessment
060 03 00	**Documentation**
060 03 01	List and explain the content required in Operations Manual for UA operations
060 04 00	**UAS Operations**
060 04 01	List the common phases and describe the checks conducted and/or considerations for each phase - Flight planning and management considerations - Contingency/Emergency planning considerations - Pre-flight phase - In-flight phase - Post-flight phase
060 04 02	Describe crew resource management (CRM) and how it can contribute to safety of UAS operations
060 05 00	**UAS Maintenance**
060 05 01	Know the difference between maintenance and flight checks
060 05 02	Explain the importance of maintenance
060 05 03	Know the importance of keeping a maintenance log
060 06 00	**UAS Emergency Procedures**
060 06 01	List the common emergencies and how these emergencies are identified - Loss of GPS - Low power - Loss of C2 link - Loss of orientation/control - Stall (aeroplane) - Fly-away
060 06 02	Explain the importance of emergency procedures
060 06 03	Development appropriate and adequate emergencies handling procedures

APPENDIX 4 UAPL PRACTICAL TRAINING LEARNING OUTCOMES

The practical training should include but not limited to the following;

1. General Knowledge of UAS Functions

The candidate should have adequate knowledge of the operating UAS as a whole which includes;

- Be able to provide an overview of the UAS in general;
- Be able to identify major components and explain its functions; and
- Be able to identify and explain different indication lights / sounds and flight modes / abnormal conditions.

2. UAS Checks

The candidate should be proficient with the pre-flight (including assembly) and post-flight checks of the UA, making reference to the Original Equipment Manufacturer (OEM) documents and UATO's training manual (if required).

3. Flight Manoeuvres via Manual Controls

The candidate should be able to demonstrate smooth and controlled flying while performing a series of manoeuvers **without GNSS assistance** that include the following if applicable;

- Precision hovering;
- Straight and Level Circuits;
- Climbing and descending Circuits;
- Figure of 8; and
- Precision landing.

4. Mission Planning and Execution

The candidate should be proficient with mission planning procedures via ground control system and able to execute / modify the mission during flight.

5. Emergency Procedures

The candidate should be able to demonstrate procedures in the event of emergencies which include minimally;

- Immediate landing;
- Abort landing;
- Emergency stop; and
- Return to home.

APPENDIX 5 CONTENTS OF ORGANISATION MANUALS

OPERATIONS MANUAL

A1 General

(a) Preamble relating to use and authority of the manual.

(b) Description of the structure and layout of the manual, including:
- various parts, sections and their contents;
- the paragraph numbering system; and
- table of contents.

(c) Amendment, revision and distribution of the manual, including:
- procedures for amendment;
- amendment record page; and
- distribution list.

(d) Glossary of significant terms and definitions.

(e) Description of the scope of training and assessment under the organisation's terms of approval.

(f) Organisation details, including:
- Organisation chart;
- Organisation policy;
- General flight planning procedures; and
- Fatigue management system.

(g) Qualifications, responsibilities and succession of command of management and key operational personnel, including but not limited to:
- Accountable Manager;
- Head of Training;
- Quality Manager;
- Instructors; and
- AFE(UA).

(h) Description of the facilities and equipment available, including:
- Facilities for staff;
- Classrooms to conduct theory lessons;
- Suitable training equipment (e.g. list of UA models and/or flight simulators); and
- Flying area to conduct practical lessons and assessment.

A2 Unmanned Aircraft Operating Information

(a) UA user manual.

(b) UA Preparation and handling, including:
- Performance limitations;
- Use of checklists;
- UA maintenance plan and procedures;

- Battery charging procedures; and
- Emergency procedures.

A3 Staff Training

(a) Details of the procedures to determine competency of instructors and AFE(UA).

(b) Details of the training program for instructors and AFE(UA).

(c) Procedures for refresher and upgrade training.

A4 Overview of Training Programme for Trainees

(a) Key components of training programme:
- Theory
- Practical

(b) Administration of key components.

A5 Conduct of Practical Assessment and Proficiency Check

(a) UATO conducting practical assessment and proficiency check should demonstrate applicable requirements such as:
- procedures for demonstrating objectively that the practical assessment and proficiency check are conducted in an un-biased manner;
- internal feedback system for detecting training deficiencies; and
- proper handling of test records.

A6 Records

Policy and procedures regarding:

(a) Attendance records;

(b) Trainee training records;

(c) Staff training and qualification records;

(d) Standardisation of record entries; and

(e) Security of records and documents.

TRAINING MANUAL

B1 Training Plan

(a) Aim of the course in the form of a statement of what the trainee is expected to be able to do as a result of the training, the level of performance, and the training constraints observed.

(b) Training curricula, including:

- theoretical knowledge curriculum; and
- flying curriculum.

(c) The general arrangements of daily and weekly programmes for training.

(d) Training policies in terms of:

- maximum student/ trainee training flights, per day/ week/ month;
- restrictions in respect of training periods for students/ trainees;
- bad weather constraints; and
- minimum rest periods.

(e) Policy for the conduct of trainee evaluation, including:

- procedures for progress checks;
- procedures for readiness evaluation; and
- procedures for refresher training.

(f) Policy regarding training effectiveness, including:

- individual trainee responsibilities;
- liaison procedures between training departments;
- procedures to correct unsatisfactory progress;
- procedures for changing instructors;
- internal feedback system for detecting training deficiencies; and
- requirements for reporting and documentation.

APPENDIX 6 APPLICATION FEES FOR UABTO AND UATO

As reproduced from the second schedule of ANR-101:

UABT Approval

1) The fee for an application for the grant of a UABT approval is $350.

2) The fee for an application to renew a UABT approval is $150.

3) The fee for an application to vary a UABT approval is $200.

UATO Approval

1) The total of the following fees must be paid for an application for the grant of a UATO approval:
   (a) for the first scope of work specified in the application $2,300
   (b) for each additional scope of work specified in the application $1,600

2) The fee for an application to renew a UATO approval is $1,400.

3) The fee for an application to vary a UATO approval is $1,600.