

## **Guidance to Instructors on Subject Delivery**

### **AIRCRAFT HANDLING AND FLYING TECHNIQUES**

#### **Programme of learning:**

- This is a suggested programme for the delivery of this subject.
- The main headings are the Learning Outcomes (LO1, LO2, etc), with sub headings related to topics within those Learning Outcomes (see Glossary of Terms).

#### **Activities:**

- Some practical activities are suggested throughout the programme as a way of reinforcing the learning and adding interest.
- It may be not be practical to undertake all of these activities at the suggested part of the programme.
- Instructors may have to adapt this programme to prevailing circumstances.

#### **Method of delivery:**

- Learning resources can be found on Ultilearn and may be adapted by the instructor, if required.
- Lesson delivery should be as practical as possible and should contain the maximum amount of cadet participation and interaction.

#### **Check of understanding:**

- Each lesson should contain a check of understanding (see Glossary of Terms).
- At the start of each lesson, the previous check of understanding should be reviewed in order to consolidate previous learning before moving on to new learning.

#### **Formative assessment:**

- There should be a formative assessment at the conclusion of each Learning Outcome (see Glossary of Terms).

#### **Summative assessment:**

- This is the Online Assessment, through Ultilearn, of the Assessment Criteria for this subject (see Glossary of Terms).
- Assessment Criteria (see Glossary of Terms) are found on the final page of this document.

<b>AIRCRAFT HANDLING AND FLYING TECHNIQUES</b>
<b>Introduction:</b> <ul style="list-style-type: none"><li>• Introduction to the subject and assessment method</li></ul>
<b>LO1: Know about aircraft maintenance and ground handling techniques</b>
<b>Introduction:</b> <ul style="list-style-type: none"><li>• Introduction to aircraft maintenance and ground-handling techniques</li></ul>
<b>Maintenance policy:</b> <ul style="list-style-type: none"><li>• Explain aircraft maintenance policy and objectives</li><li>• Explain the balance between preventive and corrective maintenance and the reasons for it</li><li>• Explain the main categories, including:<ul style="list-style-type: none"><li>○ Operational</li><li>○ Maintenance</li></ul></li><li>• Explain operational objectives, including provide aircraft needed to support commitments</li><li>• Explain maintenance objectives, including:<ul style="list-style-type: none"><li>○ Minimise costs and faults</li><li>○ Improve reliability</li></ul></li></ul>
<b>Preventative maintenance:</b> <ul style="list-style-type: none"><li>• Explain the principles of preventative maintenance</li><li>• Explain the servicing methods</li><li>• Explain scheduled maintenance</li><li>• Explain condition-based maintenance</li><li>• Explain out-of-phase maintenance</li></ul>
<b>Corrective maintenance:</b> <ul style="list-style-type: none"><li>• Explain the principles of corrective maintenance</li><li>• Explain fault-based maintenance</li><li>• Explain condition-monitoring techniques</li></ul>
<b>Contingency maintenance:</b> <ul style="list-style-type: none"><li>• Introduce contingency maintenance</li><li>• Explain the circumstances, including:<ul style="list-style-type: none"><li>○ War operations</li><li>○ Transition to war</li></ul></li></ul>

- Explain the uses, including:
  - Level of preventative maintenance considered essential in particular circumstances
  - Planned programme maintenance for each aircraft type

**Modifications:**

- Explain the principles of modifications
- Explain the reasons, including:
  - Remedying faults
  - Incorporating new technology
  - Improving performance and safety
- Explain authorised and controlled modifications, including:
  - Cost control
  - Minimisation of downtime
  - Safety of aircraft

**Overview of the role of ground-handling crews:**

- Overview explanation the roles and responsibilities of ground-handling crews

**Ground-handling techniques:**

- Introduce the principles of ground-handling techniques
- Explain the methods for marshalling aircraft in the day and at night
- Explain marshalling procedures and signals
- Explain the methods for handling chocks
- Explain methods of handling safety devices
- Explain methods of handling blanks and coves
- Explain methods of manhandling aircraft
- Explain methods of towing aircraft
- Explain methods of refuelling aircraft and types of fuel, including:
  - AVGAS
  - AVTUR
  - AVTAG
  - AVCAT
- Explain methods of aircraft loading

**Ground-handling hazards:**

- Introduce the topic of ground-handling hazards and how to reduce them
- Explain the hazards to personnel and aircraft due to ground handling

- Explain manual-handling techniques, danger areas and zones, including:
  - Propellers
  - Rotor blades
- Explain the handling and prevention of wheel and brake fires
- Explain precautions whilst refuelling, including:
  - Earthing
  - Correct grade of fuel
  - Expansion space
  - Location
  - Filtering
  - Footwear
  - Naked flame
  - Spillage
  - Radio hazard
  - Walkways
  - Suitable fire extinguishers

**Activity 1:**

- Cadets should visit an aircraft maintenance facility to view the activities

**Review:**

- Review aircraft maintenance and ground-handling techniques

**Formative assessment:**

- Formative assessment of aircraft maintenance and ground-handling techniques

## AIRCRAFT HANDLING AND FLYING TECHNIQUES

### LO2: Know the procedures required for preparation for flight

#### Introduction:

- Introduce the procedures required for preparation for flight

#### Personal preparation:

- Introduce personal preparation
- Explain why and how to be familiar with the aircraft and role
- Explain the purpose of training
- Explain why understanding the aim of flight is important
- Explain the purpose of fitness
- Explain how and why orders are read and understood
- Explain flying clothing

#### Flight planning:

- Introduce flight planning
- Explain the key factors
- Explain the roles and responsibility of the crew, including:
  - Mission tasking
  - Weather
  - Navigation
  - Flight planning
  - Flight coordination
  - Crew briefing
  - Passenger briefings

#### Responsibility of the crew:

- Explain the roles and responsibility of the crew, including:
  - Pre-flight checks
  - Weather conditions
  - Flight authorisation
  - Air traffic control clearance
  - Navigation calculation and preparation
  - Maintenance records
  - Approaching the aircraft
  - External checks
  - Internal checks

- Checks before starting
- Checks after starting
- Taxiing aircraft

**Passenger briefing:**

- Introduce the principle of briefing passengers
- Explain who is in command
- Explain the use of seat straps
- Explain crash and dinghy positions
- Explain the use of escape hatches, oxygen masks and parachutes
- Explain importance of no naked flames
- Explain radio procedures

**Taxiing:**

- Introduce taxiing
- Explain brakes and steering checks
- Explain taxiing speeds
- Explain why wind direction and speed should be considered
- Explain the process for looking out for obstacles and other aircraft

**Activity 1:**

- Cadets should view related videos

**Activity 2:**

- Cadets should practice preparation for flight activities on a flight simulator

**Review:**

- Review the procedures required for preparation for flight

**Formative assessment:**

- Formative assessment of the procedures required for preparation for flight

## AIRCRAFT HANDLING AND FLYING TECHNIQUES

### LO3: Know the principles of general, aerobatics and formation flying

#### Introduction:

- Introduce the principles of general, aerobatics and formation flying

#### Pre-flight principles:

- Introduce pre-flight principles
- Explain the airfield holding position
- Explain internal checks, including flying controls tests
- Explain external checks, including:
  - Ground control checking for damage
  - Loose panels and fuel leaks
- Explain pre-flight throttle techniques
- Explain the factors affecting the length of the take-off run, including:
  - All-up weight
  - Power
  - Wind
  - Gradient
  - Conditions
  - Temperature
  - Elevation

#### In-flight principles:

- Introduce in-flight principles
- Explain the use of the undercarriage, including:
  - Maximum speed with undercarriage down and when to retract
- Explain the use of reheat
- Explain the principles of circuits
- Explain the procedures for joining a circuit
- Explain circuit patterns
- Explain the land approach, including:
  - Use of flap
  - Effect of wind speed
  - Gradients and gusts
  - Techniques

### **Basic principles of landing:**

- Introduce the basic principles of landing
- Explain the methods for final approach, including:
  - Round-out
  - Hold-off
  - Touch down
- Explain the techniques for nose wheel aircraft and tail wheel aircraft
- Explain the techniques for cross-wind approaches and landings
- Explain the use of brakes and the effect of flaps
- Explain after-landing procedures, including:
  - Clearing the runway
  - Taxiing

### **Aerobatic flying:**

- Introduce aerobatic flying
- Explain the purpose of aerobatic flying
- Explain the checks necessary, including HASELL
- Explain the basic manoeuvres, including:
  - Loop
  - Barrel roll
  - Slow roll
  - Stall turn
  - Roll off the top
- Explain the advanced manoeuvres, including:
  - Half Rolland pull through
  - Upward roll
  - Aileron turn
  - Derry turn
  - Vertical eight
  - Horizontal figure eight

### **Inverted flight:**

- Explain the principles of inverted flight
- Explain the aircraft types used for aerobatic flying
- Explain the flying principles involved and flight controls used to achieve it

### **Formation flying:**

- Introduce the principles of formation flying
- Explain the role of leadership
- Explain the categories
- Explain section formations, including:
  - Vic
  - Echelon
  - Line abreast
  - Line astern
  - Box
- Explain close formation techniques and uses, including:
  - Relative speeds
  - Apparent size
  - Distance
- Explain tactical formation and uses
- Explain the joining formation
- Explain the positions in basic formation
- Explain what is meant by keeping station, including:
  - Longitudinal
  - Lateral
  - Vertical

### **In-flight emergencies:**

- Introduce the methods and procedures for in-flight emergencies
- Explain the degrees of emergencies, including:
  - Distress
  - Urgency
- Explain emergency transmissions, including PAT HAS ATNIE
- Explain the emergency procedures and fixer services
- Explain the use of secondary surveillance radar
- Explain the final transmission process, including when ditching and crash landing
- Explain the UHF emergency fixer service
- Explain search and rescue satellite-aided tracking
- Explain the process for emergencies involving another aircraft
- Explain the process for communications failure

- Explain speechless communications procedures
- Explain the types and roles of emergency organisations

**Activity 1:**

- Cadets should watch a video on aerobatics flying or visit an air show

**Activity 2:**

- Cadets should practice general, aerobatics and formation flying on a flight simulator

**Review:**

- Review the principles of general, aerobatics and formation flying

**Formative assessment:**

- Formative assessment of the principles of general, aerobatics and formation flying

<b>AIRCRAFT HANDLING AND FLYING TECHNIQUES</b>
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<b>Subject review:</b>
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- Review of the subject and activities

<b>Preparation for summative assessment:</b>
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- Prepare for Online Assessment on Utlilearn

<b>AIRCRAFT HANDLING AND FLYING TECHNIQUES</b>	
<b>Assessment Criteria for Each Learning Outcome</b>	
<b>Subject</b>	<b>Aircraft Handling and Flying Techniques</b>
Classification	Senior Cadet / Master Air Cadet
BTEC Aviation Studies	Unit 8: Aircraft Handling and Flying Techniques
<b>Learning Outcome</b>	<b>Assessment Criterion</b>
The learner will:	The learner can:
LO1: Know about aircraft maintenance and ground handling techniques	P1: Outline the reasons and objectives for aircraft maintenance
	P2: Describe what is meant by aircraft modifications
	P3: Outline ground handling techniques
	P4: Identify hazards and risks when ground handling aircraft
LO2: Know the procedures required for preparation for flight	P5: Describe aircrew's pre-flight personal preparation
	P6: Identify key features of flight planning
	P7: Outline pre-flight check processes
	P8: List requirements for passenger briefing prior to take-off
	P9: Describe preparations for taxiing prior to take-off
LO3: Know the principles of general, aerobatics and formation flying	P10: Outline in-flight general flying principles
	P11: Describe the landing process
	P12: List checks used prior to aerobatic flying
	P13: Outline types of aerobatic manoeuvres
	P14: Identify differences between tactical and close formation flying
	P15: Outline processes for handling in-flight emergencies

ACO Aviation Training Syllabus

**Glossary of Terms**

<b>Term</b>	<b>Meaning</b>
Learning outcomes	What a cadet is expected to know, understand or be able to do.
Assessment criteria	The standard a cadet is expected to meet to demonstrate that a learning outcome, or set of learning outcomes, has been achieved.
Guidance to instructors on subject delivery	A programme that gives the instructor guidance on the content and suggested order of delivery for a particular subject. It will include the learning outcomes, what should be covered to achieve those outcomes and any relevant practical activities.
Formative assessment	Regular and informal assessment that provides feedback throughout the learning process that supports the cadet's progress. This can take the form of checks of understanding through question and answer sessions or demonstration of an activity.
Summative assessment	Assessment of learning by an HQ Air Cadets paper-based examination or online assessment. A cadet will have to correctly answer a question that directly relates to an assessment criterion.
Examination	Paper-based exclusive choice question paper for the old syllabus subjects for Leading, Senior and Master Air Cadet.
Online assessment	Online assessment process, accessed through Utlilearn, for Leading Cadet from Sep 10 and Senior and Master Air Cadet from Sep 11.
Lesson check of understanding	Throughout and at the end of each lesson there should be a check of understanding. At the start of the next lesson, the previous check of understanding should be reviewed in order to consolidate previous learning before moving on to new learning.
Check of understanding for First Class Cadet	This is a competence-based assessment process for First Class Cadet which should test understanding through practical demonstration, activity observation, oral questioning and inspection.