

Guidance to Instructors on Subject Delivery

PILOT NAVIGATION

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.

PILOT NAVIGATION
Introduction: <ul style="list-style-type: none">• Introduction to the subject and assessment method
LO1: Know the features of air navigation and navigational aids
Introduction: <ul style="list-style-type: none">• Introduce the basic features of air navigation and navigational aids
Units of measurement: <ul style="list-style-type: none">• Introduce the units of measurement• Explain the International System of Units and International Civil Aviation Organisation alternatives, including:<ul style="list-style-type: none">○ Metres and nautical miles○ Hectopascals and millibars• Explain the measurement of vertical distance and speed, for example; feet per minute• Explain metrological units• Explain aircraft weight and fuel, for example; pounds or metric tonnes• Explain fuel conversion• Explain fuel weight to volume• Explain the use of specific gravity• Explain pressure and how air pressure varies with altitude
Position fixing: <ul style="list-style-type: none">• Introduce position fixing• Explain the methods of visual fixing• Explain radio aids, for example; radio direction finder• Explain VOR/DME and TACAN, including the use of radio beacons• Explain astro-navigation, including the use of a sextant• Explain radar navigation, including the advantages and disadvantages• Explain long-range fixing• Explain active and passive systems, including:<ul style="list-style-type: none">○ Electric warfare systems○ GPS
Aircraft map reading: <ul style="list-style-type: none">• Introduce aircraft map reading• Explain who to recognise unique features

- Explain the use of maps and charts
- Explain map scales and timing marks
- Explain the use of contact colour
- Explain the limitations, including:
 - Speed of travel
 - Weather
 - Visibility

Review:

- Review the basic features of air navigation and navigational aids

Formative assessment:

- Formative assessment of the basic features of air navigation and navigational aids

PILOT NAVIGATION
LO2: Be able to use flight-planning techniques
Introduction: <ul style="list-style-type: none">• Introduce the techniques of flight planning
Vector triangle: <ul style="list-style-type: none">• Introduce the principle of the vector triangle• Explain the triangle of velocities, including methods of calculation• Explain the information required, including:<ul style="list-style-type: none">○ Track○ Distance○ Forecast○ Height○ Air temperatures○ Indicated air speed○ True air speed○ Variation• Explain the calculation, for example; what heading aircraft must fly to counter wind effect and follow desired track over ground
Flight planning: <ul style="list-style-type: none">• Introduce flight planning• Explain the use of the pilot navigation log card• Explain and demonstrate how to complete a pilot navigation log card with appropriate data for each leg of a journey• Explain fuel planning, including:<ul style="list-style-type: none">○ Reasons○ Methods• Explain what other information may be required, for example; safety altitude• Explain the air traffic control flight plan
Review: <ul style="list-style-type: none">• Review the techniques of flight planning
Formative assessment: <ul style="list-style-type: none">• Formative assessment of the techniques of flight planning

PILOT NAVIGATION
LO3: Understand effects of weather on aviation
Introduction: <ul style="list-style-type: none">• Introduce the effects of weather on aviation
Definitions: <ul style="list-style-type: none">• Explain the definitions that relate to weather• Explain what air is• Explain temperature and pressure, including Boyle's law• Explain water vapour, including the dew point
Vertical motion in air: <ul style="list-style-type: none">• Explain the principle of vertical motion in air• Explain how clouds are formed
Hazards: <ul style="list-style-type: none">• Explain the hazards, including:<ul style="list-style-type: none">○ Icing○ Precipitation○ Turbulence○ Lightning and thunder○ Landing hazards• Explain how thunderstorm are detected, including the use of radar
Methods of measurement: <ul style="list-style-type: none">• Introduce the methods of measurement• Explain isobars• Explain high and low pressure, including; cyclones and anti-cyclones
Weather charts: <ul style="list-style-type: none">• Introduce weather charts• Explain and demonstrate the uses of weather charts• Explain how these are interpreted
Weather forecasts: <ul style="list-style-type: none">• Introduce the principle of weather forecasts• Explain the use of terminal aerodrome forecast and meteorological actual report• Explain the codes and their uses, including:

- DZ drizzle
- FG fog
- FZ freezing
- FZDZ light freezing drizzle

Review:

- Review the effects of weather on aviation

Formative assessment:

- Formative assessment of the effects of weather on aviation

PILOT NAVIGATION
Activity 1: <ul style="list-style-type: none">• Cadets should practice calculating the triangle of velocity
Activity 2: <ul style="list-style-type: none">• Cadets should practice completing the pilot navigation log card
Activity 3: <ul style="list-style-type: none">• Cadets should put into practice pilot navigation principles on a flight simulator

PILOT NAVIGATION
Subject review: <ul style="list-style-type: none">• Review of the subject and activities
Preparation for summative assessment: <ul style="list-style-type: none">• Prepare for Online Assessment on Utilearn

PILOT NAVIGATION	
Assessment Criteria for Each Learning Outcome	
Subject	Pilot Navigation
Classification	Senior Cadet / Master Air Cadet
BTEC Aviation Studies	Unit 17: Principles of Pilot Navigation
Learning Outcome	Assessment Criterion
The learner will:	The learner can:
LO1: Know the features of air navigation and navigational aids	P1: Name units of measurement used in aviation
	P2: Identify methods used for position fixing in aviation
	P3: Identify what features are useful for map reading in an aircraft at low level
	P4: Describe the limitations of visual map reading in an aircraft
LO2: Be able to use flight-planning techniques	P5: Describe use of vector triangle in flight planning
	P6: Identify factors necessary for flight planning
	P7: Describe how to calculate flight times using flight planning techniques
LO3: Understand effects of weather on aviation	P8: Identify terms used for weather in aviation
	P9: Identify reasons for vertical motion in air
	P10: Identify hazards caused by thunderstorms
	P11: Describe use of weather charts in aviation
	P12: Identify the types of weather forecasting used in aviation and the codes

ACO Aviation Training Syllabus

Glossary of Terms

Term	Meaning
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.