

Unit 26: Flight Operations

Unit code:	H/602/5681
QCF Level 3:	BTEC National
Credit value:	5
Guided learning hours	38

● Aim and purpose

The aim of this unit is for learners to gain knowledge and understanding of the complex issues associated with the planning and operation of a commercial aircraft. This will enable them to progress towards the more technical aspects of operational airport and airline employment.

● Unit introduction

Airlines across the world rely on a constant flow of timely and accurate information. This is controlled by the operations office which monitors the status of flights in several continents, covering all the time zones of the world – each with their own potential problems.

It is the job of the operations office to predict issues that may arise and to calculate and put in place measures to prevent them from becoming a potential problem that could disrupt the smooth operation of the airline.

It is important to be aware of the implications of flights being delayed, which may not only inconvenience passengers booked on a specific flight, but also those on the next flight that aircraft is scheduled to operate.

Airline crews must work within tight constraints on their permitted duty times. Any significant delay could render them legally unable to operate the flight.

The operations office is at the heart of the airline, where information flows in and out and vital pieces of data are used to inform the decision-making process. It is an important place where decisions are made at a moment's notice to ensure that safe operations are maintained.

Emergency plans and procedures must always be in place. These are tested regularly to ensure that the airline and the airport authorities are up to date with such plans and procedures.

By exploring the many areas that make up flight operations, learners will gain an understanding of the complex information network it requires.

● Learning outcomes

On completion of this unit a learner should:

- 1 Understand capacity and range factors that impact on aircraft selection for specific routes
- 2 Understand how route planning procedures and instrument navigation systems are used by aircraft operators
- 3 Understand how to devise and implement contingency plans to maintain flight operations.

Unit content

1 Understand capacity and range factors that impact on aircraft selection for specific routes

Passenger, baggage and cargo capacities of narrow-bodied and wide-bodied aircraft:

- aircraft manufacturers, e.g. Boeing, Airbus, Embraer, ATR, Bombardier
- aircraft types, e.g. passenger, combi, cargo
- capacities, e.g. seating, cargo

Range capabilities of narrow- and wide-bodied aircraft:

- ultra-long range, e.g. B747, A380
- long-range, e.g. B777, A340
- medium-range, e.g. B767, A321
- short-range, e.g. B737, F100

Aircraft types for specific routes:

- range, e.g. suitable for long haul, suitable for short haul
- passenger capacity, e.g. wide bodied for busy routes, narrow bodied for less busy routes
- cargo capacity, e.g. large belly hold for hub-to-hub routes, smaller hold for domestic or regional routes
- airport compatibility, e.g. wide bodied for major airports, smaller aircraft for regional airports

Extended-Range Twin-Engine Operational Performance Standards (ETOPs) flight requirements:

- 180-minute rule
- ETPs (equal time points)
- twin-engine operation
- engine loss
- diversion decisions
- alternates
- distance from land
- nearest airport
- emergencies
- planned responses
- procedures

2 Understand how route planning procedures and instrument navigation systems are used by aircraft operators

Route planning procedures:

- charts, e.g. Jeppesen, Aerad
- airspace, e.g. controlled, uncontrolled, flight information regions (FIR), upper information region (UIR)
- airways
- waypoints
- destination and alternate suitability, e.g. within range, compatible with aircraft type, adequate handling facilities (GHA, customs, immigration), open at planned arrival time, fuel available
- overflight and landing permission obtained
- routes, e.g. most economical flight level, optimum routing, slots
- documentation, e.g. notification to airmen (NOTAM)
- weather, e.g. significant meteorological chart (SIGMET), terminal aerodrome forecast (TAF), meteorological terminal report (METAR)
- ETOPs (extended twin operations)

Instrument navigation systems for planning a route:

- departure systems, e.g. standard instrument departure (SID)
- en-route systems, e.g. VHF omni-range (VOR), reporting points, traffic collision avoidance (TCAS), radar separation within airways, transponder
- arrival systems, e.g. standard arrival route (STAR), instrument landing system (ILS), non-directional beacon (NDB), distance measuring equipment (DME)

3 Understand how to devise and implement contingency plans to maintain flight operations

Devise contingency plans to maintain flight operations:

- types of contingency, e.g. accident at main base, accident away from base, aircraft missing, hijacking, airfield closure (weather, incident, industrial action), crew shortage, fuel shortage, aircraft technical problems, communication breakdown
- purpose of plan, e.g. ensure passenger and crew safety, minimise disruption, reduce primary and consequential delays, maintain network integrity, protect the business, avoid bad public relations

Implement contingency plans to maintain flight operations:

- instigate incident control if required, e.g. bronze command, silver command, gold command
- put emergency services on standby if required, e.g. police, ambulance, fire
- follow airline standard operating procedures (SOPs), e.g. inform senior management, crewing on alert, standby aircraft, sub-charter aircraft, cancel flights, re-route flights, charter buses, arrange hotel accommodation

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 Describe the passenger, baggage and cargo capacities of narrow bodied and wide bodied aircraft	M1 Compare the operating characteristics of two narrow bodied and two wide bodied aircraft for use on specific routes	D1 Analyse the benefits of using two different types of aircraft on a specific route
P2 Identify the range capabilities of narrow bodied and wide bodied aircraft		
P3 Explain why aircraft types are chosen for specific routes [IE]		
P4 Outline Extended-range Twin-engine Operational Performance Standards (ETOPS) flight requirements		
P5 Describe route planning procedures		
P6 Explain how instrument navigation systems are used in relation to planning a route		
P7 Explain how to devise contingency plans to maintain flight operations	M2 Discuss the importance for an airline to have a contingency plan in place	
P8 Explain how to implement contingency plans to maintain flight operations		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Learners studying this unit would benefit from building relationships with key airline staff from local airports, in particular an airline flight operations department. However, it is recognised that gaining airside access may be difficult, so learners must be given the opportunity to invite guest speakers into the classroom. This will give an excellent insight into the complex role of the flight operations officer.

To introduce the unit, learners should be made aware of the many different aircraft types in use at both major international hubs and smaller regional airports. It should be made clear why the differences exist – whether due to demand for passenger capacity, cargo space, the length of the route or the size of the runway at the destination. All aircraft manufacturers have extensive information available on their websites enabling learners to research for themselves the potential suitability of aircraft for various routes allocated by the tutor. It is possible to compare learner ideas with actual aircraft in service on the given routes.

Increasingly, extended operations by twin-engine aircraft (ETOPS) are becoming more common. There are specific requirements that airlines must comply with before such operations are allowed. Learners can research this from regulatory body websites, for example the Civil Aviation Authority (CAA) or the European Aviation Safety Agency (EASA).

It would be helpful if learners could visit, or be addressed by, key staff such as air traffic control and route planning officers. Both would provide a valuable background to help guide learner research in the complex subject areas of route planning and instrument navigation. In order to fulfil the criteria, learners may choose to devise a route, for example a commercial flight from the UK to a southern European destination, describing the route planning procedure and considerations and navigation aids used as the flight progresses. A detailed presentation or report should describe the process adequately and explain how instrument navigation is conducted.

Learners must consider the emergency procedures and planning that will be introduced when unforeseen events arise that can seriously disrupt and inconvenience the airline and its passengers. To begin with, the variety of possible incidents must be reviewed. Learners could be asked to use both personal experience and their imagination to think of realistic scenarios that could cause minor or significant disruption. They should then consider what the purpose of the contingency plan would be in each case.

Learners will also need to understand how contingency plans should be implemented. Not all elements are needed in all cases; learners must understand the appropriate actions to be taken.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way of planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment

Introduction and overview of the unit and the three learning outcomes and a review of the unit assessment methods, along with timescales and hand-out and hand-in dates.

Learner investigation into the passenger, baggage and cargo capacities of narrow-bodied and wide-bodied aircraft.

Investigation into the range capabilities of narrow-bodied and wide-bodied aircraft.

Topic and suggested assignments/activities and/assessment
Group discussion as to why aircraft types are chosen for specific routes.
Investigation Extended-Range Twin-Engine Operational Performance Standards (ETOPS) flight requirements.
Preparation for assignment
Assignment 1: Capacity and Range Factors Impacting on Aircraft Selection for Specific Routes (P1, P2, P3, P4, M1, D1)
Feedback on assignment
Tutor-led discussion into route planning procedures.
Airline expert talk to explain how instrument navigation systems are used in relation to planning a route.
Preparation for assignment
Assignment 2: Route Planning Procedures and Instrument Navigation Systems (P5, P6)
Feedback on assignment
Group discussion to formulate a contingency plans to maintain flight operations.
Tutor-led discussion on how to implement contingency plans to maintain flight.
Preparation for assignment
Assignment 3: Contingency Plans to Maintain Flight Operations (P7, P8, M2)
Feedback on assignment

Assessment

While it is expected that most of the assessment will comprise a written report, some criterion can be assessed through a presentation.

P1 – P2 – P3 – P4 – M1 – D1

To achieve P1, learners should be able to describe the passenger, baggage and cargo capacities of three narrow-bodied and three wide-bodied aircraft.

To achieve P2, learners must identify the range capabilities of two narrow-bodied and two wide-bodied aircraft at maximum take-off weight.

To achieve P3, learners must explain why four different aircraft types are chosen for specific routes (two short haul, two long haul). Attention should be paid to range capability, capacity (passenger and cargo) and compatibility with destination airports.

To achieve P4, learners must outline Extended-Range Twin-Engine Operational Performance Standards (ETOPS) flight requirements. Learners should include two examples of aircraft types and two airlines that comply with the requirements.

M1 can be achieved by learners comparing the operating characteristics of two narrow-bodied and two wide-bodied aircraft on two specified routes, suggesting which type of aircraft may be better suited to each route.

D1 requires an analysis of the benefits of using two different aircraft types on a specific route, for example learners could consider a B747 versus a A380 on LHR/JFK route, analysing which aircraft is best suited to this route and giving reasons why.

P5 – P6

To achieve P5, learners should be able to describe the route planning process and its procedures. Learners should devise a route and then produce a comprehensive description of all the route planning considerations that have been taken into account.

To achieve P6, learners must explain how instrument navigation systems are used in relation to planning a route. This could be combined with P5 to produce a single report or presentation.

P7 – P8 – M2

To achieve P7, learners must explain how to devise contingency plans to maintain flight operations following four unexpected occurrences that could disrupt airline operations (two minor, two major).

To achieve P8, learners must explain how to implement contingency plans to maintain flight operations. This can be combined with P7 to produce a single report or presentation.

M2 requires learners to discuss the importance of an airline having a contingency plan in place, the discussion could also include consideration of the issues involved of not having one in place.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, P2, P3, P4, M1, D1	Assignment 1: Capacity and Range Factors Impacting on Aircraft Selection for Specific Routes	In your role as an airline route planner, you need to report on the operating characteristics of different aircraft for specific routes.	Presentation or fact sheets
P5, P6	Assignment 2: Route Planning Procedures and Instrument Navigation Systems	In your role as an airline route planner, you need to report on route planning.	Report or presentation
P7, P8, M2	Assignment 3: Contingency Plans to Maintain Flight Operations	In your role as an airline route planner, you need to report on devising and implementing contingency plans to maintain flight operations.	Report or presentation

Links to other BTEC units

This unit forms part of the BTEC aviation sector suite. This unit has particular links with the following unit titles in the aviation suite.

Level 2	Level 3	Level 4
n/a	Unit 5: Development of the UK Aviation Industry since 1945	n/a

Essential resources

Learners must have access to library and research facilities, and current trade publications.

Employer engagement and vocational contexts

Learners should have access to accurate and up-to-date industry case studies. Industry visits and guest speakers are recommended.

Indicative reading for learners

Publication

Civil Aviation Authority – CAP168 – Licensing of Aerodromes

Websites

www.caa.co.uk

Civil Aviation Authority – UK aviation regulator

www.easa.europa.eu

European Aviation Safety Agency (EASA)

www.luton.gov.uk/Media%20Library/Word/Chief%20executives/Emergency%20Planning/Airport%20SOP%20version%201.1%20April%202007.doc

Example Airport Emergency Plan (Luton Airport)

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	researching for themselves the potential suitability of aircraft for various routes.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Independent enquirers	exploring different aircraft capacities and capabilities
Creative thinkers	thinking of realistic scenarios that could cause minor or significant disruption and how to devise and implement appropriate contingency plans
Team workers	working in groups to devise a route and discuss the route-planning procedures and systems required
Self-managers	managing the workload of the unit assessment
Effective participators	describing how to devise and implement appropriate contingency plans.

● Functional Skills — Level 2

Skill	When learners are ...
ICT — Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using a variety of systems to research and explain capacity and range factors that impact on aircraft selection and routes
Use ICT to effectively plan work and evaluate the effectiveness of the ICT system they have used	planning and carrying out research using appropriate search criteria
Manage information storage to enable efficient retrieval	organising work into folders to enable retrieval and development
Follow and understand the need for safety and security practices	logging in to a variety of systems securely and visiting trusted websites
Troubleshoot	as required.
ICT — Find and select information	
Select and use a variety of sources of information independently for a complex task	investigating aircraft selected by operators for various routes
Access, search for, select and use ICT-based information and evaluate its fitness for purpose	using appropriate search criteria in order to research the aircraft selected for various routes.
ICT — Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: <ul style="list-style-type: none"> • text and tables • images • numbers • records 	entering and developing images, diagrams and text to communicate how route planning procedures and instrument navigation systems are used by aircraft operators
Bring together information to suit content and purpose	collating notes and research findings on route planning procedures
Present information in ways that are fit for purpose and audience	communicating route planning procedures and navigation systems clearly and accurately
Evaluate the selection and use of ICT tools and facilities used to present information	selecting the most appropriate ICT tools to produce presentations and reports throughout the unit
Select and use ICT to communicate and exchange information safely, responsibly and effectively including storage of messages and contact lists	receiving and sharing research documents with tutor and colleagues, paying attention to confidentiality issues.

Skill	When learners are ...
Mathematics	
Understand routine and non-routine problems in a wide range of familiar and unfamiliar contexts and situations	exploring capacity and range factors that impact on aircraft selection and routes
Identify the situation or problem and the mathematical methods needed to tackle it	
Select and apply a range of skills to find solutions	describing route planning procedures
Use appropriate checking procedures and evaluate their effectiveness at each stage	
Interpret and communicate solutions to practical problems in familiar and unfamiliar routine contexts and situations	
Draw conclusions and provide mathematical justifications	exploring capacity and range factors that impact on aircraft selection and routes.
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	working in groups to devise a route and discuss the route-planning procedures and systems required
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	comparing different aircraft capacities and capabilities
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	writing a report on contingency plans.