



# **Aviation General Course Year 12**

## **Selected Unit 3 syllabus content for the**

### **Externally set task 2019**

This document is an extract from the *Aviation General Course Year 12 syllabus*, featuring all of the content for Unit 3. The content that has been highlighted in the document is the content on which the Externally set task (EST) for 2019 will be based.

All students enrolled in the course are required to complete an EST. The EST is an assessment task which is set by the Authority and distributed to schools for administering to students. The EST will be administered in schools during Term 2, 2019 under standard test conditions. The EST will take 50 minutes.

The EST will be marked by teachers in each school using a marking key provided by the Authority. The EST is included in the assessment table in the syllabus as a separate assessment type with a weighting of 15% for the pair of units.

# Unit 3

## Unit description

The focus of this unit is the further development of aviation concepts related to flying training and general aviation. Students develop their understanding of aerodynamics. They apply the terminology and principles of navigation to learn how to prepare aeronautical maps for visual navigation. They explore the formation and interaction of weather on aviation operations. Students understand the principles, purpose and need for safety management in aviation. Students consider issues associated with flight crew resource management and the development of threat and error management (TEM).

In Aviation development, they study a selection of current developments in aviation looking at the factors driving the developments, and their likely impact.

## Unit content

An understanding of the Year 11 content is assumed knowledge for students in Year 12. It is recommended that students studying Unit 3 and Unit 4 have completed Unit 1 and Unit 2.

This unit includes the knowledge, understandings and skills described below.

### Aerodynamics

#### Principles of flight

- review disposition of forces of an aircraft in level flight, a climb with power, descent, glide and turn
- aerodynamic characteristics of stalling and spinning
- wing loading and load factor calculations and consequent increase in stall speed
- factors affecting directional stability: position of centre of gravity, size of the fin and rudder movement
- factors affecting lateral stability: high and low wing configurations, dihedral configurations, sweepback
- factors affecting longitudinal stability: position of centre of gravity, movement of centre of pressure, changes in thrust, tailplane movement
- spiral instability, static and dynamic stability
- purpose and operation of trim tabs, stability
- purpose and use of spoilers and speed brakes

### Performance and operation

#### Navigation, meteorology and radio communication

- air navigation terminology including: indicated air speed, calibrated airspeed, drift, estimated time of departure, actual time of departure, estimated time of arrival, actual time of arrival, estimated time interval, actual time interval, air position, dead reckoning position, track required, track made good, and cross wind component

- principles of air navigation including
  - application of magnetic variation and deviation in the operation of the compass
  - the relationship between heading/TAS, wind speed and direction, and track and ground speed (triangle of velocities)
  - using a map, calculate one of the velocities, given the other two
  - determination of drift angle (track made good to track required) and the adjustment required to correct it and return to the track required by a given point using a map
  - performing speed/time/distance/fuel calculations using a calculator
  - determining head/tailwind and crosswind components graphically, given a wind velocity and direction
- time
  - effects of Earth's rotation and revolution around the Sun in relation to beginning and end of daylight and period of daylight
- flight planning
  - the purpose and use of QNH, QFE, 1013 hPa pressure datums
  - the purpose and distinction between the use of flight levels and altitude
  - the concepts of pressure height and density height
- general concepts of meteorology
  - cloud formation processes
  - atmospheric stability and instability, adiabatic process, environmental lapse rate
  - synoptic chart interpretation
  - seasonal weather conditions in different regions of Australia with respect to visibility, prevailing winds, typical cloud patterns and precipitation, seasonal pressures and frontal systems, and tropical cyclones
  - the purpose of the current weather forecasts and reports used by general aviation
  - occurrence and formation of thunderstorms, low cloud, fog (advection and radiation), poor visibility, turbulence, thermals, dust devils, wind shear, microbursts, tropical cyclones and the nature of the hazard which each poses to aircraft operations

## Aviation skills

### Practical flight skills

- use of Microsoft Flight Simulator – Cessna 172 to demonstrate general handling of aircraft including:
  - normal take-off and landing
  - straight and level flight
  - climbing, descending
  - medium turn, Rate 1 turn, steep turn (45° and 60° angles of bank)
  - transition from climb to level flight
  - transition from level flight to climb
  - transition from level flight to cruise descent and glide
  - transition from descent to level flight
  - entry and recovery from power off stall
  - appropriate trim changes

## Process skills

- identify potential safety hazards
- communicate effectively with others in verbal or written forms
- record observations verbally and graphically
- research and extract relevant information
- make reliable measurements and accurately record data

## Human factors

### Aviation safety

- common causes of general aviation aircraft accidents
- reasons for incorporating TEM into aircraft operations
- effects of human factors on aviation safety, including stress, training, fatigue, communication skills, assertiveness and judgement, cockpit culture
- effects on aviation safety of aircraft design, ergonomics, maintenance, air traffic control, and meteorological factors
- the importance of situational awareness on decision making associated with safe flight

### Aviation development

- factors influencing the ongoing development and/or likely impact of:
  - aircraft capacity and range
  - power plants (fuel efficiency, electric)
  - safety management system
  - unmanned aerial vehicle (UAV)
  - aircraft noise