



## SAMPLE COURSE OUTLINE

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AVIATION  
GENERAL YEAR 11

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## Sample course outline

### Aviation – General Year 11

#### Unit 1 and Unit 2

#### Semester 1

Week	Key teaching points
1–4	<p><b>Aerodynamics: Principles of flight</b></p> <ul style="list-style-type: none"> <li>• types of and roles played by ‘heavier than air’ aircraft</li> <li>• terminology associated with major parts of ‘heavier than air’ aircraft</li> <li>• wing types</li> <li>• empennage types</li> <li>• basic aerodynamic terms related to lift, drag and stability including: aerofoil, span, chord, camber, thickness/chord ratio, relative airflow, angle of attack, angle of incidence, wing loading, total reaction, lift, drag, aerodynamic stall, lift/drag ratio, laminar flow, turbulent flow and boundary layer</li> <li>• lift generation in terms of Newton’s Third Law, Bernoulli’s Principle (dynamic pressure, static pressure, total pressure), and the Coanda effect</li> <li>• use of vectors to represent force and velocity</li> <li>• lift and drag formulae and associated terminology: coefficient of lift, coefficient of drag, air density, velocity and surface area</li> <li>• graphical representation of total drag: induced, and profile drag</li> <li>• wake turbulence</li> <li>• disposition of forces of an aircraft in level flight, a climb with power, descent, glide and turn</li> <li>• purpose and use of primary flight controls: elevator, aileron and rudder</li> <li>• the difference between stable, neutrally stable and unstable flight states</li> <li>• terminology: directional, lateral and longitudinal stability</li> <li>• purpose and/or operation of the aerodynamic design features: dihedral, aspect ratio, sweepback, wash out, flaps, fixed canards, and trim tabs</li> </ul> <p><b>Task 1: Principles of flight test</b></p>
5–9	<p><b>Performance and operation: Navigation, meteorology and radio communication</b></p> <ul style="list-style-type: none"> <li>• gyroscopic flight instruments: purpose, operation and limitations of the attitude indicator, direction indicator and turn coordinator</li> <li>• the effects of failure of gyroscopic flight instruments</li> <li>• purpose, operation, limitations and errors of the pitot static system and its instruments: the airspeed indicator, altimeter and vertical speed indicator</li> <li>• the effects of failure of either pitot or static pressure source</li> <li>• magnetic compasses: principles of operation, characteristics and general limitations of use</li> <li>• navigation <ul style="list-style-type: none"> <li>▪ basic navigation terminology, including: track, heading, distance, time, true air speed, wind velocity, ground speed, magnetic north, true north, magnetic variation, bearings, relative bearings, position lines and fix</li> <li>▪ Mercator and Lambert Conformal conic projections</li> <li>▪ difference between great circles and rhumb lines</li> <li>▪ identification of points on the Earth’s surface by parallels of latitudes and meridians of longitude</li> <li>▪ difference between geographic and magnetic poles</li> <li>▪ magnetic variation and isogonals</li> <li>▪ maps and documents in navigation: world aeronautical chart (WAC), visual terminal chart (VTC), visual navigation chart (VNC), en-route chart (ERC), planning chart Australia (PCA), en-route supplement Australia (ERSA)</li> </ul> </li> </ul>

Week	Key teaching points
	<ul style="list-style-type: none"> <li>• basic navigation principles <ul style="list-style-type: none"> <li>▪ track and distance determination using appropriate navigation equipment</li> <li>▪ estimation of track and distance without equipment</li> <li>▪ application of magnetic variation in the operation of the compass</li> <li>▪ bearings, relative bearings, position lines and obtaining a fix</li> <li>▪ conversions of length, speed, weight and volume units, including feet/metres, nautical miles/kilometres, pounds/kilograms, US gallons/litres/kilograms of avgas</li> <li>▪ map reading: map to ground, ground to map, topographical features using a WAC chart</li> </ul> </li> <li>• time <ul style="list-style-type: none"> <li>▪ terms associated with time: Coordinated Universal Time (UTC), local mean time, local standard time, local summer time</li> <li>▪ conversions between local mean time, UTC, local standard time and summer time</li> </ul> </li> </ul> <p><b>Task 2: Navigation test</b></p> <p><b>Aviation skills: Practical flight skills</b></p> <ul style="list-style-type: none"> <li>• use of Microsoft Flight Simulator – Cessna 172 to demonstrate general handling of aircraft including: <ul style="list-style-type: none"> <li>▪ normal take-off and climb</li> <li>▪ straight and level flight</li> <li>▪ climbing and climbing turns</li> <li>▪ descending and descending turns</li> <li>▪ level medium turn, level rate1 turn</li> <li>▪ trim for climb attitude and level flight attitude</li> </ul> </li> </ul> <p><b>Aviation skills: Process skills</b></p> <ul style="list-style-type: none"> <li>• identify potential safety hazards</li> <li>• record observations verbally and graphically</li> <li>• communicate effectively with others in verbal or written forms</li> <li>• research and extract relevant information</li> </ul>
10–11	<p><b>Performance and operation: Navigation and meteorology and radio communication</b></p> <ul style="list-style-type: none"> <li>• general concepts of meteorology <ul style="list-style-type: none"> <li>▪ International Civil Aviation Organisation (ICAO) Standard Atmosphere</li> <li>▪ divisions of the atmosphere</li> <li>▪ Earth’s general wind circulation</li> <li>▪ variation in atmospheric pressure</li> <li>▪ formation of pressure systems</li> <li>▪ pressure systems terminology, including high, low, ridge, trough, col</li> <li>▪ local winds, including land and sea breezes, katabatic and anabatic winds, and fohn winds</li> <li>▪ classification of cloud types</li> <li>▪ describing cloud cover measuring in OKTAs</li> <li>▪ humidity, relative humidity, dew point temperature</li> <li>▪ air masses affecting Australia</li> <li>▪ introduction to synoptic charts</li> <li>▪ weather associated with pressure systems</li> <li>▪ frontal systems</li> </ul> </li> </ul> <p><b>Aviation skills: Practical flight skills</b></p> <p><b>Task 3: Meteorology test</b></p> <p><b>Task 4: Practical flight skills test</b></p>

12–14	<p><b>Performance and operation: Aviation systems and structures</b></p> <ul style="list-style-type: none"> <li>• airframe structure and materials <ul style="list-style-type: none"> <li>▪ truss, semi-monocoque, monocoque structures</li> <li>▪ wood, fabric, steel, aluminium alloy and carbon fibre composite materials</li> </ul> </li> <li>• relative advantages and disadvantages of different types of airframe structures and materials</li> </ul> <p><b>Task 5:</b> Investigation – Airframe structures and materials</p>
15	<p><b>Aviation development</b></p> <ul style="list-style-type: none"> <li>• aviation development since the Wright brothers' first flight, including: <ul style="list-style-type: none"> <li>▪ technology (aircraft design, engines, avionics, and instruments)</li> <li>▪ factors driving these developments</li> <li>▪ social and economic impact of aviation development</li> </ul> </li> </ul> <p><b>Task 6:</b> Investigation – Aviation development since the Wright brothers' first flight</p>

## Semester 2

Week	Key teaching points
1–3	<p><b>Performance and operation: Navigation, meteorology and communication</b></p> <ul style="list-style-type: none"> <li>• principles of radio wave propagation, including amplitude and cycle</li> <li>• definitions: frequency, attenuation, reflection, refraction</li> <li>• characteristics associated with radio wave propagation in the ultra-high frequency (UHF), very high frequency (VHF), high frequency (HF) bands and medium frequency (MF) band</li> <li>• definitions: frequency, attenuation, reflection, refraction</li> <li>• determining approximate VHF range using the line-of-sight formula</li> <li>• phonetic alphabet</li> <li>• operation of basic light aircraft radio systems</li> <li>• airside and landside layout of a typical airport, including runways, taxiways, aprons, terminal buildings and control tower</li> <li>• terminology associated with the legs of a circuit</li> <li>• characteristics of registered, certified, authorised landing areas, and helicopter landing sites</li> <li>• significance of ground symbols near the windsock, on the movement area and on runways</li> </ul> <p><b>Task 7:</b> Communications test</p>
4–7	<p><b>Performance and operation: Propulsion</b></p> <ul style="list-style-type: none"> <li>• components of an internal combustion engine</li> <li>• principles of operation of internal combustion diesel and petrol engines</li> <li>• engine timing and necessity of valve lead, lag and overlap</li> <li>• correct engine management using tachometer, oil temperature, oil pressure, fuel pressure, cylinder head temperature and exhaust gas temperature gauges</li> <li>• purpose, components and operation of the ignition, lubrication, induction, carburetion, fuel injection and fuel systems</li> <li>• aerodynamic principles associated with fixed pitch propellers</li> <li>• changing angles of attack of propeller blades during acceleration</li> <li>• limitations of fixed pitch propellers</li> </ul> <p><b>Task 8:</b> Investigation – Fixed wing propellers</p>
8–9	<p><b>Performance and operation: Aviation law</b></p> <ul style="list-style-type: none"> <li>• role of International Civil Aviation Organisation (ICAO)</li> <li>• role of the Civil Aviation Safety Authority (CASA)</li> <li>• Australian aviation legislative framework and other documentation, including Air Navigation Act 1920, Air Navigation Orders, Aeronautical Information Publication, Civil Aviation Advisory Publications, Civil Aviation Regulations, Civil Aviation Safety Regulations, Civil Aviation Orders, Enroute Supplement Australia (ERSA)</li> <li>• airspace classifications used in Australia for terminal and en-route airspace, including controlled and non-controlled aerodromes used by general aviation aircraft</li> </ul>

Week	Key teaching points
	<ul style="list-style-type: none"> <li>terminology: air traffic control, control area, control zone, controlled airspace, prohibited, restricted and danger (PRD) areas, common traffic advisory areas (CTAF), non-controlled airspace</li> <li>the purpose and distinction between instrument flight rules and visual flight rules</li> <li>the purpose and distinction between instrument flight conditions and visual flight conditions</li> </ul> <p><b>Task 9:</b> Aviation law test  <b>Aviation skills: Practical flight skills</b></p>
10	<p><b>Aviation development</b></p> <ul style="list-style-type: none"> <li>the structure of and services provided by aviation in Australia today, including: <ul style="list-style-type: none"> <li>airlines</li> <li>charter</li> <li>airwork (air freight, Royal Flying Doctor Service (RFDS), training, agricultural, coastal surveillance)</li> <li>recreation</li> <li>military</li> </ul> </li> <li>support functions provided by: <ul style="list-style-type: none"> <li>CASA</li> <li>ground support (maintenance, catering, baggage handling)</li> <li>air traffic control (ATC)</li> <li>Rescue and Fire Fighting Services (RFFS)</li> <li>meteorological services</li> </ul> </li> </ul> <p><b>Task 10:</b> Investigation – Aviation services and support functions in Australia  <b>Aviation skills: Practical flight skills</b></p>
11–12	<p><b>Performance and operation: Aircraft performance</b></p> <ul style="list-style-type: none"> <li>definition of pressure and density height, and how to calculate each</li> <li>factors which affect take-off and landing performance</li> <li>calculation of take-off and landing distances for Cessna 172 (C172)</li> <li>aircraft loading terminology, including: arm, moment, datum, station, index unit, centre of gravity (CoG) and CoG limits, basic empty weight, maximum take-off weight</li> <li>understand the principles of moments and the impact of changes to weight and position</li> <li>understand the purpose of a datum in the determination of CoG</li> <li>conversion of fuel volume to weight, conversion of weight units</li> <li>deriving loading information from the C172 loading charts</li> <li>complete loading problems, including determining centre of gravity (CoG) position within limits (and possible redistribution if CoG found to be outside limits)</li> </ul> <p><b>Aviation skills: Practical flight skills</b>  <b>Task 11:</b> Practical flight skills test</p>
13–15	<p><b>Human factors</b></p> <ul style="list-style-type: none"> <li>basic structure and function of the respiratory system</li> <li>basic structure and function of the circulatory system</li> <li>basic structure and function of the ear, both auditory and vestibular systems</li> <li>basic structure and function of the eye</li> <li>standards of visual acuity required of a pilot</li> <li>the cause of common eye deficiencies, including myopia, hypermetropia, astigmatism, presbyopia, and what is required to correct them</li> <li>night vision</li> </ul> <p><b>Task 12:</b> Investigation – The eye and vision</p>