



SAMPLE COURSE OUTLINE

AVIATION
ATAR YEAR 11

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Sample course outline

Aviation – ATAR Year 11

Unit 1 and Unit 2

Semester 1

Week	Key teaching points
1–4	<p>Aerodynamics: Principles of flight</p> <ul style="list-style-type: none"> • basic aerodynamic terms, 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 • explanation of lift generation in terms of Newton’s Third Law of Motion, Bernoulli’s Principle, and Coanda effect • difference between stable, neutrally stable and unstable flight states • terminology: directional, lateral and longitudinal stability • lift and drag formulae and associated terminology: coefficient of lift, coefficient of drag, dynamic pressure, static pressure, total pressure • graphical representation of total drag: induced, and profile drag • purpose and/or operation of the aerodynamic design features: aspect ratio, wash out, flaps, fixed canards and trim tabs • wake turbulence <p>Task 1: Aerodynamics test Start research for Task 4: Aviation development</p>
5–6	<p>Performance and operation: Navigation, meteorology and radio communication</p> <ul style="list-style-type: none"> • concept of control and monitoring in three dimensions, requirements for visual flight, and additional requirements for flight in instrumental meteorological condition (IMC) <ul style="list-style-type: none"> ▪ gyroscopic flight instruments: purpose, operation and limitations of the attitude indicator, direction indicator and turn coordinator ▪ the effects of failure of gyroscopic flight instruments ▪ purpose, operation, limitations and errors of the pitot static system and its instruments: the airspeed indicator, altimeter and vertical speed indicator ▪ the effects of failure of either pitot or static pressure source ▪ magnetic compasses: principles of operation, characteristics and general limitations of use <p>Aviation skills: Practical flight skills (Flight simulation – one lesson per week)</p> <ul style="list-style-type: none"> • use of Microsoft Flight Simulator – Cessna 172 to demonstrate general handling of aircraft including: <ul style="list-style-type: none"> ▪ normal take-off and climb ▪ straight and level flight ▪ climbing and descending ▪ climbing and descending turns ▪ medium turn ▪ trim for climb, descent and cruise attitudes <p>Aviation skills: Process skills</p> <ul style="list-style-type: none"> • identify potential safety hazards • record observations verbally and graphically • communicate effectively with others in verbal or written forms • research and extract relevant information

7–10	<p>Performance and operation: Navigation, meteorology and radio communication</p> <ul style="list-style-type: none"> • navigation <ul style="list-style-type: none"> ▪ basic navigation terms, 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 ▪ properties associated with Mercator and Lambert Conformal conic projections ▪ difference between great circles and rhumb lines ▪ locating points on the Earth’s surface by parallels of latitudes and meridians of longitude ▪ difference between geographic and magnetic poles ▪ magnetic variation and isogonals ▪ principles of operation, purpose and limitations of Backup (Legacy) radio navigation systems: <ul style="list-style-type: none"> o automatic direction finder (ADF) o VHF omni-range (VOR) o distance measuring equipment (DME) ▪ maps and documents in navigation: World Aeronautical Chart (WAC), Visual Terminal Chart (VTC), Visual Navigation Chart (VNC), En-route Chart (ERC) Low, Planning Chart Australia (PCA), En-Route Supplement Australia (ERSA) ▪ Notice to Airmen (NOTAM) <p>Aviation skills (Flight simulation)</p>
11–14	<p>Performance and operation: Navigation, meteorology and radio communication</p> <ul style="list-style-type: none"> • basic navigation principles <ul style="list-style-type: none"> ▪ track and distance determination using appropriate navigation equipment ▪ estimating track and distance without equipment ▪ application of magnetic variation in the operation of the compass ▪ bearings, relative bearings, position lines and obtaining a fix ▪ conversions of length, speed, weight and volume units, including feet/metres, nautical miles/kilometres, pounds/kilograms, US gallons/litres/kilograms of avgas ▪ map reading: map to ground, ground to map, topographical features using a WAC chart • time <ul style="list-style-type: none"> ▪ Coordinated Universal Time (UTC), local mean time, local standard time, local summer time ▪ effect of changes of longitude on local mean time ▪ conversions between local mean time, UTC, local standard time and summer time ▪ effects of Earth’s rotation and revolution around the Sun in relation to beginning and end of daylight and period of daylight • general concepts of meteorology <ul style="list-style-type: none"> ▪ International Civil Aviation Organisation (ICAO) Standard Atmosphere ▪ divisions of the atmosphere ▪ Earth’s general wind circulation ▪ variation in atmospheric pressure ▪ formation of pressure systems ▪ pressure systems terminology, including high, low, ridge, trough, col ▪ local winds, including land and sea breezes, katabatic and anabatic winds, and fohn winds ▪ classification of cloud types ▪ describing cloud cover measuring in OKTAs ▪ humidity, relative humidity, dew point temperature ▪ air masses affecting Australia ▪ introduction to synoptic charts ▪ weather associated with pressure systems ▪ frontal systems <p>Task 2: Practical examination Task 3: Performance and operation test</p>

15	<p>Aviation development: Aviation history and developmental influences</p> <ul style="list-style-type: none"> civilian and military aviation development since the Wright brothers' first flight, including: <ul style="list-style-type: none"> technology (aircraft design, engines, avionics, all-weather ops) impact on social and economic development <p>Task 4: Investigation – Aviation development</p>
16	<p>Task 5: Written examination</p>

Semester 2

Week	Key teaching points
1–2	<p>Aerodynamics: Principles of flight</p> <ul style="list-style-type: none"> disposition of forces of an aircraft in level flight, a climb with power, descent, glide and turn purpose and use of primary flight controls: elevator, aileron and rudder
3–4	<p>Performance and operation: Navigation, meteorology and communication</p> <ul style="list-style-type: none"> principles of radio wave propagation, including amplitude and cycle 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 definitions: frequency, attenuation, reflection, refraction determining approximate VHF range using the line-of-sight formula phonetic alphabet obtaining required radio frequencies from aviation documentation operation of basic light aircraft radio systems significance of taxiway and runway markings terminology associated with the legs of a circuit characteristics of registered, certified, authorised landing areas and helicopter landing sites significance of ground symbols near the windsock, on the movement area and on runways air traffic control (ATC) light signals visual flight rules (VFR), including visual meteorological conditions (VMC) below 10,000ft in Australian airspace <p>Task 6: Performance and operation – Navigation test</p> <p>Aviation skills (Flight simulation)</p>
5–7	<p>Performance and operation: Propulsion</p> <ul style="list-style-type: none"> components of an internal combustion engine principles of operation of an internal combustion diesel and petrol engine engine timing and necessity of valve lead, lag and overlap internal combustion engines used in aircraft, including horizontally opposed, in-line, rotary and radial correct engine management using tachometer, oil temperature, oil pressure, fuel pressure, cylinder head temperature and exhaust gas temperature gauges purpose, components and operation of the ignition, lubrication, induction, carburetion, fuel injection and fuel systems aerodynamic principles associated with fixed pitch propellers changing angles of attack of propeller blades during acceleration limitations of fixed pitch propellers effects of propeller operation, including slipstream, torque and gyroscopic effects <p>Task 7: Investigation – Development of petrol/diesel engines</p> <p>Aviation skills (Flight simulation)</p>
8–9	<p>Performance and operation: Aviation law</p> <ul style="list-style-type: none"> role of International Civil Aviation Organisation (ICAO) role of Civil Aviation Safety Authority (CASA) Australian aviation legislative framework and other documentation, including <i>Air Navigation Act 1920</i>, Air Navigation Orders, Aeronautical Information Publication, Civil Aviation Advisory

Week	Key teaching points
	<p>Publications, Civil Aviation Regulations, Civil Aviation Safety Regulations, Civil Aviation Orders, Enroute Supplement Australia (ERSA)</p> <ul style="list-style-type: none"> airspace classifications used in Australia for terminal and en-route airspace, including controlled and non-controlled aerodromes used by general aviation aircraft terminology: air traffic control, control area, control zone, controlled airspace, VFR lanes of entry and reporting points, prohibited, restricted and danger (PRD) areas and common traffic advisory frequency (CTAF) airspace clearance requirements at towered aerodromes broadcast requirements at CTAF aerodromes <p>Task 8: Performance and operation – Aviation law test Aviation skills (Flight simulation) Task 9: Practical examination</p>
10–11	<p>Performance and operation: Aircraft performance</p> <ul style="list-style-type: none"> determination of pressure and density height for take-off and landing factors which affect take-off and landing performance calculation of take-off and landing distances for Cessna 172 aircraft loading terminology, including: arm, moment, datum, station, index unit, Centre of Gravity (CoG) and CoG limits, basic empty weight, zero fuel weight, ramp weight, maximum take-off weight conversion of fuel volume to weight, conversion of weight units derive loading information from loading charts (Alpha, Bravo and Charlie) complete loading problems, including determining Centre of Gravity (CoG) position within limits (and possible redistribution if CoG found to be outside limits) <p>Task 10: Performance and operation – Aircraft performance test</p>
12–13	<p>Human factors</p> <ul style="list-style-type: none"> basic structure and function of the respiratory system basic structure and function of the circulatory system basic structure and function of the ear, both auditory and vestibular systems basic structure and function of the eye standards of visual acuity required of a pilot night vision <p>Task 11: Human factors test</p>
14–15	<p>Aviation development: Aviation history and developmental influences</p> <ul style="list-style-type: none"> the structure of and services provided by aviation in Australia today, including: <ul style="list-style-type: none"> airlines charter airwork (air freight, Royal Flying Doctor Service (RFDS), training, agricultural, coastal surveillance) recreation military support functions provided by: <ul style="list-style-type: none"> CASA airports ground support (maintenance, catering, baggage handling) air traffic control (ATC) Rescue and Fire Fighting Services (RFFS) meteorological services
16	<p>Task 12: Written examination</p>