Curriculum Council

AVIATION

IMPORTANT INFORMATION

Syllabus review

Once a course syllabus has been accredited by the Curriculum Council, the implementation of that syllabus will be monitored by the syllabus committee. This committee can advise council about any need for syllabus review. Syllabus change deemed to be minor requires schools to be notified of the change at least six months before implementation. Major syllabus change requires schools to be notified 18 months before implementation. Formal processes of syllabus review and requisite reaccreditation will apply.

Other sources of information

The Western Australian Certificate of Education (WACE) Manual contains essential information on assessment, moderation and other procedures that need to be read in conjunction with this course.

The Curriculum Council will support teachers in delivering the course by providing resources and professional development online.

The council website www.curriculum.wa.edu.au provides support materials including sample programs, assessment outlines, assessment tasks, with marking keys, sample examinations with marking keys and grade descriptors with annotated student work samples.

Training package support materials are developed by Registered Training Organisations (RTOs), government bodies and industry training advisory bodies to support the implementation of industry training packages. Approved support materials are listed at www.ntis.gov.au

WACE providers

Throughout this course booklet the term 'school' is intended to include both schools and other WACE providers.

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Rationale

Aviation involves flying by mechanical means, especially with heavier-than-air craft. The study of aviation therefore encompasses the application of skills and understandings about the nature of the atmosphere, aerodynamics and the systems and structures designed to achieve safe and efficient flight.

Aviation has transformed the world in which we live. Efficient and reliable air transport has changed the way people travel, work, communicate and relate to each other. Simultaneously, developments in military aviation and aerospace technology have redefined approaches to national and international security. Aviation contributes significantly to the global economy and both directly and indirectly affects the lives of all the world's citizens. The nature and scope of aviation is constantly changing, driven by major developments in technology, science, education and economics. In Australia, aviation has been fundamental to overcoming problems associated with the country's physical size and population distribution.

The Aviation course draws from such diverse disciplines as Science, Engineering, Environmental Science, Social Science, Mathematics, English and Information Technology. It encompasses a range of mathematical, technological and humanities concepts and draws together a broad variety of skills, processes, understandings and strategies that promote the safe and effective operations of the aviation industry. The Aviation course provides students with the opportunity to investigate the importance of aviation to our society and learn the skills and knowledge needed to make informed decisions on issues relating to aviation and associated industries.

The Aviation course is designed to stimulate and foster intellectual curiosity and promote logical and analytical thinking. It aims to equip students to become informed citizens, able to participate in discussions about challenging technological, social and environmental issues. It enables them to achieve their own potential in all aspects of aviation and encourages them to achieve their personal best in all undertakings, and to respect the achievement of others.

Through the achievement of the Aviation course outcomes, students have the opportunity to develop their achievement of several overarching outcomes of the Curriculum Framework and a range of Learning Area outcomes. Links and interaction with the community, industry and higher education institutions will provide students with a range of vocational experiences that, together with industry expertise, will assist them to develop transferable life and work skills.

The Aviation course caters for the learning needs of all students, from those seeking a career in aviation, science or engineering, to others pursuing an avid interest in the subject. Achievement of the course outcomes may be used by students in the selection process for university and TAFEWA colleges. Students undertaking relevant Vocational Education and Training (VET) programs may use evidence of their achievement of competencies toward recognition of achievement of related course outcomes.

The course also caters for students who do not wish to pursue further studies beyond Year 12. Course content is sufficiently diverse to provide students with the necessary foundation to meet employment needs in a range of occupations not limited to the aviation industry.

This course provides students with the opportunity to further their achievement of specific overarching learning outcomes from the Curriculum Framework together with the development of the core-shared values.

Course outcomes

The Aviation course is designed to facilitate the achievement of four outcomes. These outcomes are based on the Science, Mathematics, Society and Environment, and Technology and Enterprise learning area outcomes in the Curriculum Framework. Outcomes are statements of what students should know, understand, value and be able to do as a result of the syllabus content taught.

Outcome 1: Aviation systems
Students understand components of, and interactions between aviation systems.
In achieving this outcome, students:

- understand the components of aviation systems; and
- understand the interactions between aviation systems.

Outcome 2: Aviation operations
Students apply processes to plan aviation operations.
In achieving this outcome, students:

- collect, organise and interpret operational information; and
- plan aviation operations.

Outcome 3: Aviation applications
Students apply a range of skills and processes to perform specific aviation operations.
In achieving this outcome, students:

- apply operational, organisational and communication skills and processes appropriate to aviation operations;
- monitor and evaluate variables in aviation systems; and

- implement a course of action and manage resources.

Outcome 4: Aviation development
Students understand the influences on aviation developments and their impact on society.
In achieving this outcome, students:
- understand significant aviation developments and their impact on society; and
- understand that significant aviation development is influenced by the needs of society.

Outcome progressions

Each of the outcomes is described as a learning progression across six broad levels (see Appendix 1). In teaching a particular course unit, teachers can use the outcome progressions along with the unit content and contexts to:
- plan appropriate lessons and activities for their students, and
- develop specific assessment tasks and marking keys.

Course content

The course content needs to be the focus of the learning program. It enables students to maximise their achievement of both the overarching learning outcomes from the Curriculum Framework and the Aviation course outcomes.

It is advised that the course content is best delivered in paired units: 2A and 2B; 3A and 3B.

The course content is divided into four content areas:
- aerodynamics
- performance and operation
- human factors
- aviation development.

Aerodynamics

Principles of flight
The nature of air as a fluid interacting with an aircraft underpins the understandings of aerodynamics (Bernoulli's Principle, Newton's Third Law of Motion). Various factors affect the capacity to generate and/or influence the aircraft lifting and controlling forces (lift/drag formulae). The forces acting on an aircraft or helicopter in all phases of flight, including subsonic through to hypersonic flight, turning, climbing, descending, cruise and within space are explored, together with aircraft controls and their effects in the air, on the ground and in space, stability and instability of aircraft and the ability of aircraft to manoeuvre.

Performance and operation

Propulsion
Since the first official powered flight in 1903, aircraft have been powered by an array of different engines ranging from the basic two-stroke reciprocating engine to the supersonic combustion ramjet engine (Scramjet). Knowledge of the basic structure, principles of operation and operating procedures are explored leading to a comprehensive understanding of aircraft propulsion.

Aviation systems and structures
Aircraft range in size, type and complexity from balloons, gliders and basic powered training aeroplanes and helicopters to modern airliners and sophisticated spacecraft. The physical structure and design of aircraft must take account of the stresses and tensions acting on an aircraft during every flight. Knowledge of the evolution of aircraft systems and structures leads to a clearer understanding of present design and appreciation of future innovations.

Aircraft performance
The limiting effects of environmental conditions and aircraft power factors are evaluated and applied to the operation of the aircraft during ground movement and throughout the flight. Aircraft limitations include weight and balance of the aircraft through loading, takeoff and climb performance, altitude, endurance, range and speed according to available engine power and atmospheric conditions. A number of processes are involved to select information accurately, calculate, interpret and apply performance and operational data.

Aviation law
Aviation operations in Australia are governed by a legislative framework that stems from association with the International Civil Aviation Organisation (ICAO). Knowledge of the structure of legislation and other documents outlining aviation regulations and requirements in Australia is examined. Rules and regulations governing pilot operations are identified and appropriate regulatory publications and documents used to extract this information.

Navigation, meteorology and radio communication
The fundamental function of aviation is to move aircraft through the sky from one point to another in a variety of meteorological conditions. Communication supports the safety of aircraft in the air and on the ground. Understanding of basic principles of navigation, propagation and communication, interpretation of aviation charts and forecasts, development of navigation processes and techniques and applying meteorological influences, and the development of correct use of radio communication and phraseology, ensures safer skies and airports.

Human factors

Aviation safety
Aviation safety relates to the recognition of responsibilities in operating and working with aircraft and at airports. Knowing normal operational and emergency procedures and processes and safety management strategies protects lives in the aircraft and on the ground. The provision of a secure operational aviation environment, free from deliberate interference due to sabotage or terrorism, has become an area of increasing concern in both commercial and military aviation. Lessons of safety and security have been learnt from past incidents and accidents. Case studies are used to identify causal factors in aviation incidents and accidents, and to investigate aviation occupational health and safety (OSH) issues. Australia's attitude towards safety has proved outstanding. However, some parts of the world have a less-stringent attitude toward safety, resulting in aircraft losses and fatalities.

Human performance and resource management
The physical, psychological and emotional makeup of the human organism places limitations on safe human performance in aviation operations. This strongly influences resource management in aviation, including the effective use of human resources, physical resources and information. Resource management involves team strategies, problem-solving strategies, clearly-defined tasks, effective decision-making strategies, understanding of culture within decision-making processes, leadership and communication, workload management, situational awareness and managing workplace relations. Tools such as checklists are utilised to self assess an operation and one's ability to perform it.

Aviation development

Aviation history and developmental influences
Many individual achievements and technological developments have resulted in the rapid expansion of the aviation industry. While early aviation was driven by the desire to fly, subsequent advances in technology have impacted significantly on aviation development and our society. The recognition of the achievements of pioneering individuals and an understanding of the technological advancements in aviation, provide an insight into the possible future trends of air travel.

Course units

Each unit is defined with a particular focus and a selection of learning contexts through which the specific unit content can be taught and learnt. The cognitive difficulty of the content increases with each stage and is referenced to the broad learning described in the outcome progressions. The pitch of the content for each stage is notional and there will be overlap between stages.

Stage 1 units provide bridging support and a practical and applied focus to help students develop skills required to be successful for Stage 2 units. The content is notionally pitched at levels 3 to 4.

Stage 2 units provide opportunities for applied learning but there is a focus more on academic learning. The content is notionally pitched at levels 4 to 6.

Stage 3 units provide opportunities to extend knowledge and understandings in challenging academic learning contexts. The content is notionally pitched at levels 6 to 8.

Unit 1AAVN

The focus for this unit is on basic aviation concepts in contexts related to **glider operations.** Students gain an understanding of aerodynamic principles associated with non-powered craft, identifying aerodynamic structures and flight controls incorporated into their design.

Unit 1BAVN

The focus for this unit is on basic aviation concepts in contexts related to **ultralight and sport aviation.** Students are introduced to aircraft structures and the forces acting on powered aircraft during flight.

Unit 2AAVN

The focus for this unit is on aviation concepts in contexts related to **flying training: general aviation**. Students understand the basic principles of flight associated with fixed wing aircraft. They gain an understanding of the internal combustion engine and related propulsive devices. Aircraft systems are examined and components and purposes identified.

Unit 2BAVN

The focus for this unit is on aviation concepts in contexts related to **flying training: general aviation.** Students learn about the principles of flight associated with rotary wing aircraft. They understand the purpose and necessity of civil aviation publications, identify specific rules and regulations governing flight in and around controlled and uncontrolled aerodromes and understand the meteorological conditions that may affect flight.

Unit 3AAVN

The focus for this unit is on aviation concepts in contexts related to **flying training: advanced aviation**. Students investigate the aerodynamic principles of Bernoulli, Coanda Effect and Newton, explore the disposition of forces in specific flight manoeuvres, investigate various types of aircraft stability and understand how aircraft are flown to achieve specific flight characteristics. They learn how to prepare a map for navigation and flight planning purposes and use radio navigation aids to supplement navigation. The interaction of weather on aviation operations, and the rules regarding visibility are investigated.

Unit 3BAVN

The focus for this unit is on aviation concepts in contexts related to **flying training: advanced aviation**. Students further their understanding of aircraft operations and human limitations in relation to flight. They explore current types of propulsion used in commercial and military jet aircraft and investigate aerodynamic principles associated with subsonic and supersonic flight.

Time and completion requirements

The notional hours for each unit are 55 class contact hours. Units can be delivered typically in a semester or in a designated time period up to a year depending on the needs of the students. Pairs of units can also be delivered concurrently over a one year period. Schools are encouraged to be flexible in their timetabling in order to meet the needs of all of their students.

A unit is completed when all assessment requirements for that unit have been met. Only completed units will be recorded on a student's statement of results.

Refer to the WACE Manual for details about unit completion and course completion.

Vocational Education Training information

Vocational Education Training (VET) is nationally recognised training that provides practical work skills and credit towards, or attainment of, a vocational education and training qualification.

When considering VET delivery in courses it is necessary to:

- refer to the WACE Manual, Section 6: Vocational Education Training, and
- contact education sector/systems representatives for information on operational issues concerning VET delivery options in schools.

Australian Quality Training Framework (AQTF)

AQTF is the quality system that underpins the national vocational education and training sector and outlines the regulatory arrangements in states and territories. It provides the basis for a nationally consistent, high-quality VET system.

The AQTF Standards for Registered Training Organisations outline a set of auditable standards that must be met and maintained for registration as a training provider in Australia.

VET delivery

VET can be delivered by schools providing they meet Australian Quality Training Framework (AQTF) requirements. Schools need to become a Registered Training Organisation (RTO) or work in partnership (auspicing arrangement) with an RTO to deliver training within the scope for which they are registered. If a school operates in partnership with an RTO, it will be the responsibility of the RTO to assure the quality of the training delivery and assessment. Qualifications identified in this course must be on the scope of registration of the RTO delivering or auspicing training.

Units of competency from selected training package qualifications have been taken into account during the development of this course.

Schools seeking to link delivery of this course with units of competency or qualification must read the information outlined in the relevant training package/s. This information can be found at the National Training Information Service website: www.ntis.gov.au.

National Training Package

TDA03 Aviation

Qualifications

TDA10103 Certificate I in Transport and Distribution (Aviation Foundation Skills)
TDA20203 Certificate II in Transport and Distribution (Aviation Flight Operations)
TDA20403 Certificate II in Transport and Distribution (Aviation Ground Operations and Service)
TDA40403 Certificate III in Transport and Distribution (Aviation Ground Operations and Service)

Note: Any reference to qualifications and units of competency from training packages is correct at the time of accreditation.

Resources

A detailed list of textbooks, teacher references, teacher guides and manuals can be found at www.det.wa.edu.au/education/cmis/eval/curriculum/courses/

Assessment

Refer to the WACE Manual for policy and principles for both school-based assessment and examinations.

School-based assessment

The three types of assessment in the table below are consistent with the teaching and learning strategies considered to be the most supportive of student achievement of the outcomes in the Aviation course. The table provides details of the assessment types, including examples of different ways that they can be applied and the weighting range for each assessment type.

Teachers are to use the assessment table to develop their own assessment outlines.

An assessment outline needs to be developed for each class group enrolled in each unit of the course. This outline includes a range of assessment tasks that cover all assessment types and course outcomes with specific weightings. If units are delivered concurrently, assessment requirements must still be met for each unit.

In developing assessment outlines and teaching programs the following guidelines should be taken into account.

- All tasks should take into account teaching, learning and assessment principles from the Curriculum Framework.
- There is flexibility within the assessment outline for teachers to design school-based assessment tasks to meet the learning needs of students.
- Student responses may be communicated in any appropriate form e.g. written, oral, graphical, multimedia or various combinations of these.
- Student work submitted to demonstrate achievement of outcomes should only be accepted if the teacher can attest that, to the best of her/his knowledge, all uncited work is the student's own.
- Evidence collected for each unit should include tasks conducted under test conditions.

Assessment table

Weightings **All stages**	**Type of assessment**
10%	**Investigation** Research work in which students plan and conduct an investigation. Investigations in relation to aviation principles, systems and structures, performance and operations, law and safety, exploring a range of primary and secondary sources. Types of evidence may include observation checklists, evaluation tools (self, peer,) journal, PowerPoint®, video, audio, written presentation. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2 and 4.*
70%	**Response** Students apply their knowledge and skills in responding to a series of stimuli or prompts. Response to, analysis and evaluation of an aviation issue or scenario. Types of evidence may include observation checklists, evaluation tools (self, peer), journal. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2, 3 and 4.*
20%	**Performance** Assessment of students engaged in an activity: on the spot evaluation of a performance. Managing, planning, interpreting and adapting aviation operations to ensure optimum performance. Types of evidence may include observation checklists, evaluation tools (self, peer), journal, portfolio. *Best suited to the collection of evidence on student achievement of Outcomes 2 and 3.*

Grades

Schools assign grades following the completion of the course unit. The following grades may be used:

Grade	Interpretation
A	Excellent achievement
B	High achievement
C	Satisfactory achievement
D	Limited achievement
E	Inadequate achievement

Preliminary Stage units are not graded. Achievement in these units is reported as either Completed or Not Completed.

Each grade is based on the student's overall performance for the course unit as judged by reference to a set of pre-determined standards. These standards are defined by grade descriptors.

Grade descriptors:

- describe the range of performances and achievement characteristics of grades A, B, C, D and E in a given stage of a course
- can be used at all stages of planning, assessment and implementation of courses, but are particularly important as a final point of reference in assigning grades
- are subject to continuing review by the Council.

The grade descriptors for this course can be accessed on the course page at (http://www.curriculum.wa.edu.au/internet/Senior_Secondary/Courses/Aviation)

Examination details

There are separate examinations for Stage 2 pairs of units and Stage 3 pairs of units.

In their final year, students who are studying at least one Stage 2 pair of units (e.g. 2A/2B) or one Stage 3 pair of units (e.g. 3A/3B) will sit a written and a practical examination in this course, unless they are exempt.

The Aviation examination comprises a written examination worth 80% of the total examination score and a practical (performance) examination worth 20% of the total examination score.

Each examination will assess the specific content, knowledge and skills described in the syllabus for the pair of units studied.

Details of the examinations in this course are prescribed in the examination design briefs (pages 23–27).

UNIT 1AAVN

Unit description

The focus for this unit is on basic aviation concepts in contexts related to **glider operations**. Regardless of their formal aviation education, most students have an awareness of aircraft and the aviation industry. Teachers should therefore select learning contexts that are applicable to the interests of their students and enhance their previous understandings of aviation knowledge.

Students gain an understanding of aerodynamic principles associated with non-powered craft, identifying aerodynamic structures and flight controls incorporated into their design.

Glider instrumentation and radio phraseology used in the local flying environment are investigated. Pertinent authorities which regulate glider operations in Australia and associated aeronautical publications are investigated.

Students gain an understanding of environmental factors which affect glider operations and investigate launching methods.

Students investigate the development of manned, non-powered aircraft and their impact on society.

Unit learning contexts

Within the broad area of **glider operations**, teachers may choose one or more of the following contexts (this list is not exhaustive):

- hang gliding
- gliding
- ballooning
- model aircraft building (gliders).

Unit content

This unit includes knowledge, understandings and skills with the degree of complexity described below:

Aerodynamics

Aircraft general knowledge

- types of aircraft
- terminology of aircraft
- wing types
- empennage types
- roles of aircraft.

Non-powered principles of flight

- aerodynamic principles related to non-powered flight
- forces acting on a glider
- aerodynamic structures incorporated into the design of manned non-powered aircraft
- forces acting on a glider during turns, climbs, and descent.

Control systems

- primary controls of a glider
- purpose and function of each control system
- three axes of movement.

Aircraft systems

Flight controls

- mechanics of primary controls
- specific non-conventional controls associated with gliders.

Instruments

Flight instruments

- purpose and operation of instruments required for non-powered flight, pitot-static system.

Performance and operation

Glider performance

- environmental factors and their consequences which affect aircraft performance such as temperature, state of the atmosphere, terrain, wind, air density, surface and length of runway.

Launch mechanisms

- methods of launching a glider including a tow launch and a winch launch
- advantages and disadvantages of powered gliders.

Meteorology

Terminology

- basic meteorological terms and concepts.

Glider operations

- meteorological conditions conducive to glider operations
- orographic uplift and thermals as applied to glider operations
- theory of ridge soaring.

Communications

Radio phraseology

- phonetic alphabet
- simple radio calls required for glider operations.

Law

Aviation authorities

- role and authority of International Civil Aviation Organisation (ICAO), Civil Aviation Safety Authority (CASA), Air Transport Safety Bureau (ATSB), Air Services Australia
- roles and responsibility of the Gliding Federation of Australia.

Documentation

- purpose of publications: Civil Aviation Regulations (CAR), Civil Aviation Orders (CAO), Aeronautic Information Publication (AIP) and Civil Aviation Advisory Publication (CAAP), their usefulness in aviation operations.

Aviation development

Glider development

- development of manned, non-powered aircraft through to the modern day.

VET units of competency

Units of competency may be delivered in appropriate learning contexts if all AQTF requirements are met. Some suggested units of competency suitable for integration are:

TDTF197B Follow OSH procedures

Note: Any reference to qualifications and units of competency from training packages is correct at the time of accreditation.

Assessment

The three types of assessment in the table below are consistent with the teaching and learning strategies considered to be the most supportive of student achievement of the outcomes in the Aviation course. The table provides details of the assessment type, examples of different ways that these assessment types can be applied and the weighting range for each assessment type.

	Type of assessment
10%	**Investigation** Research work in which students plan and conduct an investigation. Investigations in relation to aviation principles, systems and structures, performance and operations, law and safety, exploring a range of primary and secondary sources. Types of evidence may include observation checklists, evaluation tools (self, peer,) journal, PowerPoint®, video, audio, written presentation. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2 and 4.*
70%	**Response** Students apply their knowledge and skills in responding to a series of stimuli or prompts. Response to, analysis and evaluation of an aviation issue or scenario. Types of evidence may include observation checklists, evaluation tools (self, peer), journal. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2, 3 and 4.*
20%	**Performance** Assessment of students engaged in an activity: on the spot evaluation of a performance. Managing, planning, interpreting and adapting aviation operations to ensure optimum performance. Types of evidence may include observation checklists, evaluation tools (self, peer), journal, portfolio. *Best suited to the collection of evidence on student achievement of Outcomes 2 and 3.*

UNIT 1BAVN

Unit description

The focus for this unit is on basic aviation concepts in contexts related to **ultralight and sport aviation**. In this unit students are introduced to aircraft structures and the forces acting on powered aircraft during flight.

Students examine engine arrangements and their respective cycles, engine instrumentation and the aerodynamic principles associated with propellers.

Rules and regulations related to ultra light aircraft, radio phraseology associated with flight, and meteorological factors which effect aircraft performance are examined. Physiological factors and navigation principles pertinent to aircraft performance and operation are introduced.

Students trace the development of sport aviation and explore its impact on society.

Unit learning contexts

Within the broad area of **ultralight and sport aviation**, teachers may choose one or more of the following contexts (this list is not exhaustive):

- ultralight aircraft
- home-built or kit aircraft
- dirigibles
- model aircraft building (powered).

Unit content

Aerodynamics

Powered aircraft

- disposition of forces on a powered aircraft in straight and level flight
- design traits used to improve inherent stability.

Aircraft structures

- truss, semi-monocoque, monocoque structures, terminology associated with aircraft structures, materials used in aircraft construction
- relative advantages and disadvantages of different structure types and materials used in aircraft structures
- structures and materials commonly used for ultralight and sport aviation aircraft.

Propulsion

Piston engine

- engine arrangements
- engine terminology: cylinder, piston, gudgeon pin, connecting rod, valve, crankshaft, crankcase, pushrod, rocker arm, four stroke cycle, two stroke cycle.

Propeller

- basic aerodynamics of a fixed pitch propeller.

Aircraft systems

Engine controls

- operation of the engine throttle and mixture controls
- effect of throttle and mixture changes on aircraft performance.

Instruments

Engine instruments

- function of the tachometer, fuel gauge, oil pressure gauge, oil temperature gauge.

Performance and operation

Aircraft performance

- effect of atmospheric conditions on engine performance
- effect of atmospheric conditions on overall aircraft performance.

Meteorology

Local weather

- local weather patterns
- local weather hazardous to aircraft operations including mechanical turbulence, dust devils
- formation of land and sea breezes.

Communications

Radio phraseology

- radio calls necessary for circuit operations at a non-towered airfield.

Law

Ultralight operations

- aircraft requirements for ultralight operations within Australia
- pilot requirements for ultralight operations.

Experimental aircraft

- regulations pertaining to Experimental aircraft
- operations allowed under the Experimental regulations.

Navigation

Basic navigation theory

- aviation navigation terminology
- symbols associated with World Aeronautical Charts (WAC)
- navigation ruler and protractor measurement of distance and track on WAC.

Human factors

Introduction to physiology

- introduction to the eye, ear and respiratory system
- effect of altitude on the human body
- situational awareness in all phases of flight.

Aviation development

Sport aviation

- development of powered sport aviation e.g. aerobatic competitions, pylon racing.

VET units of competency

Units of competency may be delivered in appropriate learning contexts if all AQTF requirements are met. Some suggested units of competency suitable for integration are:

TDTF197B Follow OSH procedures
TDTB197B Check and assess operational capabilities of equipment
TDAB103A Inspect and report on an aerodrome
TDTE701A Use communication systems

Note: Any reference to qualifications and units of competency from training packages is correct at the time of accreditation.

Assessment

The three types of assessment in the table below are consistent with the teaching and learning strategies considered to be the most supportive of student achievement of the outcomes in the Aviation course. The table provides details of the assessment type, examples of different ways that these assessment types can be applied and the weighting range for each assessment type.

Weighting Stage 1	Type of assessment
10%	**Investigation** Research work in which students plan and conduct an investigation. Investigations in relation to aviation principles, systems and structures, performance and operations, law and safety, exploring a range of primary and secondary sources. Types of evidence may include observation checklists, evaluation tools (self, peer,) journal, PowerPoint®, video, audio, written presentation. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2 and 4.*
70%	**Response** Students apply their knowledge and skills in responding to a series of stimuli or prompts. Response to, analysis and evaluation of an aviation issue or scenario. Types of evidence may include observation checklists, evaluation tools (self, peer), journal. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2, 3 and 4.*
20%	**Performance** Assessment of students engaged in an activity: on the spot evaluation of a performance. Managing, planning, interpreting and adapting aviation operations to ensure optimum performance. Types of evidence may include observation checklists, evaluation tools (self, peer), journal, portfolio. *Best suited to the collection of evidence on student achievement of Outcomes 2 and 3.*

UNIT 2AAVN

Unit description

The focus for this unit is on aviation concepts in contexts related to **flying training: general aviation**. Students understand the basic principles of flight associated with fixed wing aircraft. They gain an understanding of the internal combustion engine and related propulsive devices. Aircraft systems are examined and components and purpose identified.

Students investigate specific flight instruments and examine their purpose, operation and limitation. They trace the development of the internal combustion engine in aviation and explore its impact on society.

Unit learning contexts

Within the broad area of **flying training: general aviation**, teachers may choose one or more of the following contexts (this list is not exhaustive):

- flight training operations
- survey work
- aerial photography
- agricultural flight.

Unit content

This unit includes knowledge, understandings and skills with the degree of complexity described below:

Aerodynamics

- components of an aircraft, aircraft terminology
- forces acting on an aircraft in flight
- flight controls
- lift generation using Bernoulli Theory and Newton's Third Law
- manoeuvring an aircraft in flight and on the ground
- aircraft stability, wake turbulence.

Advanced terminology

- terminology: aerofoil, span, chord, camber, thickness/chord ratio, relative airflow, angle of attack, angle of incidence, wing loading, total reaction, lift, drag, lift/drag ratio, laminar flow, turbulent flow, boundary layer.

Design features

- purpose of aerodynamic design features: anhedral, dihedral, aspect ratio, sweepback/forward, wash in/out, spoilers, flaps, vortex generators, trim tabs
- purpose and function of unconventional controls: stabilators, ruddervators, elevons, flaperons, canards, and speedbrakes.

Lift and drag

- theories of lift generation: Ski Effect, Newton's Third Law, Bernoulli's Theory and Coanda Effect
- lift and drag formulae and terminology: coefficient of lift, coefficient of drag, dynamic pressure, static pressure, total pressure
- graphical representation of total drag: induced, and profile drag
- graphs: maximum drag, maximum lift, best lift/drag ratio speed, best glide range speed.

Flight manoeuvres

- disposition of forces of an aircraft in level flight, climb, descent, turns and glide
- relationship between speed, angle of bank, turn radius and rate of turn in a balanced, level turn
- rule of thumb to determine approximate bank angle for rate one turn
- purpose and use of frise and differential ailerons
- aerodynamic characteristics of stalling and spinning.

Performance considerations

- flying an aircraft to achieve maximum range and endurance
- using graphs to determine stall speed, best range, best endurance, maximum level flight speed
- calculating load factor and wing loading.

Stability and control

- effect of centre of gravity in relation to longitudinal stability, movement of centre of pressure, changes in thrust, tailplane movement, high and low wing affecting lateral stability, dihedral, sweepback
- effect of centre of gravity position on directional stability, size of the fin and rudder moment
- spiral instability, static and dynamic stability, controllability
- purpose of trim tabs, balance tabs, anti-balance tabs, aerodynamic balance and mass balance
- stability and controllability during ground operation
- propeller torque, slipstream, gyroscopic effect, asymmetrical effect and ground effect.

Performance and operation

Instruments

Engine instruments

- purpose and operation of the following instruments: tachometer, oil temperature and pressure gauge, fuel pressure gauge.

Gyroscopic flight instruments

- purpose, operation and limitations of the following gyroscopic instruments: attitude indicator, direction indicator, turn co-ordinator.

Pressure instruments
- purpose, operation and limitations (errors) of the pitot static system including the airspeed indicator, altimeter and vertical speed indicator.

Electronic Flight Information System (EFIS) and HUD
- electronic flight information system (EFIS) and head-up display (HUD), glass cockpit
- navigation displays, engine displays.

Aircraft systems
- purpose and operation of the following systems: ignition, lubrication, induction, fuel, electrical, hydraulic, carburation, fuel injection.

Engine handling
- correct operation of start-up and shut down of aircraft engines
- correct use of mixture control, manifold pressure (MAP), engine RPM, and use of incorrect fuel octane
- reading of engine gauges: exhaust gas temperature (EGT), MAP, cylinder head temperature (CHT).

Engine malfunctions
- correct and incorrect use of hydraulic, electrical, fuel, ignition and vacuum systems.

Aviation development

Engine development
- petrol and diesel aircraft engines.

Careers in aviation
- flying careers: civil and military
- non-flying careers: civil and military.

VET units of competency

Units of competency may be delivered in appropriate learning contexts if all AQTF requirements are met. Some suggested units of competency suitable for integration are:

TDTE397B Participate in basic workplace communication
TDAZ503A Maintain basic situation awareness in the aviation workplace
TDTF1097B Apply fatigue management strategies
TDAB103A Inspect and report on an aerodrome
TDTE701A Use communication systems
TDAE103A Maintain aircraft radio communications
TDAE203A Use air traffic control communication procedures

Note: Any reference to qualifications and units of competency from training packages is correct at the time of accreditation.

Assessment

The three types of assessment in the table below are consistent with the teaching and learning strategies considered to be the most supportive of student achievement of the outcomes in the Aviation course. The table provides details of the assessment type, examples of different ways that these assessment types can be applied and the weighting range for each assessment type.

Weighting Stage 2	Type of assessment
10%	**Investigation** Research work in which students plan and conduct an investigation. Investigations in relation to aviation principles, systems and structures, performance and operations, law and safety, exploring a range of primary and secondary sources. Types of evidence may include observation checklists, evaluation tools (self, peer,) journal, PowerPoint®, video, audio, written presentation. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2 and 4.*
70%	**Response** Students apply their knowledge and skills in responding to a series of stimuli or prompts. Response to, analysis and evaluation of an aviation issue or scenario. Types of evidence may include observation checklists, evaluation tools (self, peer), journal. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2, 3 and 4.*
20%	**Performance** Assessment of students engaged in an activity: on the spot evaluation of a performance. Managing, planning, interpreting and adapting aviation operations to ensure optimum performance. Types of evidence may include observation checklists, evaluation tools (self, peer), journal, portfolio. *Best suited to the collection of evidence on student achievement of Outcomes 2 and 3.*

UNIT 2BAVN

Unit description

The focus for this unit is on aviation concepts in the contexts related to **flying training: general aviation**. Students understand the principles of flight associated with rotary wing aircraft.

Students understand the purpose and necessity of civil aviation publications, identify specific rules and regulations governing flight in and around controlled and uncontrolled aerodromes and have an understanding of meteorological conditions that may affect flight.

Students become familiar with aircraft and airframe limitations and perform calculations to determine safe operations into, and out of specified aerodromes. The basic principles associated with visual navigation and performing elementary flight plan calculations are introduced, and students become conversant with appropriate maps and charts used in navigation.

Students understand the evolution of the jet airliner and jet fighter, and explore their impact on society.

Unit learning contexts

Within the broad area of **flying training: general aviation**, teachers may choose one or more of the following contexts (this list is not exhaustive):

- flight training operations
- aerobatic and joy flights
- charter flights
- emergency or rescue operations.

Unit content

This unit includes knowledge, understandings and skills with the degree of complexity described below:

Aerodynamics

Propulsion

Internal combustion engine

- components of an internal combustion engine
- principle of operation of an internal combustion diesel and petrol engine
- necessity of valve lead, lag and overlap
- engine timing
- variety of internal combustion engines including horizontally opposed, in-line, rotary and radial.

Fixed pitch propeller

- aerodynamic principles associated with fixed pitch propellers
- propeller blade twist or washout
- angle of attack of propeller blades changes during acceleration
- limitations of fixed pitch propellers
- effects of propeller operation including slipstream, torque, gyroscopic and asymmetric.

Superchargers and turbochargers

- function and purpose of superchargers and turbochargers.

Constant speed unit

- principles of operation of constant speed unit
- coordinated use of throttle and propeller pitch to maintain a desired power setting
- variation of propeller design including full feathering and reverse pitch.

Reaction engines

- Newton's Third Law and its application to reaction engines
- operation of turbofan, turbojet and turboprop
- operation of ramjet, pulsejet and rocket engine.

Communications

Radio wave propagation

- 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) and high frequency (HF) bands
- definitions: frequency, attenuation, reflection, refraction
- determining approximate VHF range using rule of thumb.

Radio telephony

- phonetic alphabet
- local radio procedures and phraseology for circuit flying and flights to/from the training area
- distress and urgency transmissions
- radio failure procedures.

Basic radio controls

- operation of radio controls.

Phraseology

- radio phraseology in relation to operation in the circuit General Aviation Aerodrome Procedures (GAAP) and non-controlled, Common Traffic Advisory Frequency (CTAF) and local training area.

Radio practical operation

- obtaining appropriate radio frequencies
- operating a typical light aircraft radio system/s
- use of squelch control to eliminate background noise
- radio phraseology in relation to transmission of time, cloud amounts, aerodrome visibility, readability scale
- urgency and distress messages used in radio communication.

Law

Documentation

- purpose of the following documents: CAR, CAO, AIP and CAAP, en-route supplement Australia, notice to airmen, aeronautical information circular.

Pilot licence privileges and limitations

- requirements, recency and limitation of a student pilot's licence
- requirements, recency and limitation of a private pilot's licence
- locating information pertaining to pilots' responsibilities, aerodrome meteorological minima, flights over water, flights over populated areas, designated remote areas, carriage of passengers, cargo, sick and disabled people, parachutist, flotation and survival equipment, animals and dangerous goods, carriage of firearms, flight in PRD areas.

Aerodromes

- significance of taxiway and runway markings, legs of a circuit
- licensed and unlicensed aerodromes.

Flight rules and conditions of flight

- basic rules of visual flight rules (VFR) flight including: VMC and altimetry below 10,000m
- smoking, drugs and alcohol
- aerodrome operations, separation minima, operation in the vicinity of an aerodrome, light signals.

Air service operations

- pilot responsibilities including: carriage of passengers, fuelling of aircraft, ground operations, passenger pre-flight briefing, authority of pilot in command, pre-flight aircraft inspections.

Emergencies and SAR

- difference between an accident and incident
- terminology: Search and Rescue Time (SARTIME), Uncertainty Phase (INCERFA), Alert Phase (ALERFA), Distress Phase (DETRESFA), extract emergency procedures from En-route Supplement Australia (ERSA).

Airspace

- airspace classifications including GAAP and non-controlled aerodromes (towered and non-towered)
- terminology: flight information region, flight information area, flight information service, air traffic control, control area, control zone, controlled airspace, radio reports, broadcasts, VFR lanes of entry, Prohibited, Restricted and Danger (PRD) areas, CTAF, GAAP aerodromes, controlled aerodromes
- operational requirements for CTAF and towered aerodromes
- terminology: area QNH, local QNH, QFE, transition layer, transition level, flight level.

Performance and operation

Airframe limitations

- speed limitations: normal operating speed (Vno), never exceed speed (Vne), maximum manoeuvre speed (Va), turbulence penetration speed (Vb), flap operating speed (Vfo), flep extended speed (Vfe), limit and design load factors.

Take off and landing performance

- pressure and density height
- factors which affect take-off and landing performance
- take-off and landing distances for a Cessna 172 and a Piper Turbo Lance.

Airworthiness and aircraft equipment

- use and purpose of a maintenance release.

Aircraft loading

- loading terminology including: arm, moment, datum, station, index unit, centre of gravity (CoG), CoG limits, basic empty weight, zero fuel weight, ramp weight
- Alpha loading system.

Loading charts

- deriving loading information from loading charts (Alpha, Bravo and Charlie)
- completing loading problems including determining centre of gravity (CoG) position within limits (and possible redistribution if found to be out of limits).

Cessna 172

- use of Cessna take-off and landing charts to determine either distance required or maximum take-off or landing weight
- use of Cessna performance charts to determine centre of gravity
- aerodynamic principles to achieve maximum endurance and range.

Aviation development

- evolution of the airliner or military combat aircraft (fighter/attack/stealth)
- impact of the airliner or military combat aircraft on the world
- current and future development of the airliner or military combat aircraft.

VET units of competency

Units of competency may be delivered in appropriate learning contexts if all AQTF requirements are met. Some suggested units of competency suitable for integration are:

TDTG197B Work effectively with others
TDAZ503A Maintain basic situation awareness in the aviation workplace.

Note: Any reference to qualifications and units of competency from training packages is correct at the time of accreditation.

Assessment

The three types of assessment in the table below are consistent with the teaching and learning strategies considered to be the most supportive of student achievement of the outcomes in the Aviation course. The table provides details of the assessment type, examples of different ways that these assessment types can be applied and the weighting range for each assessment type.

Weighting Stage 2	Type of assessment
10%	**Investigation** Research work in which students plan and conduct an investigation. Investigations in relation to aviation principles, systems and structures, performance and operations, law and safety, exploring a range of primary and secondary sources. Types of evidence may include observation checklists, evaluation tools (self, peer,) journal, PowerPoint®, video, audio, written presentation. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2 and 4.*
70%	**Response** Students apply their knowledge and skills in responding to a series of stimuli or prompts. Response to, analysis and evaluation of an aviation issue or scenario. Types of evidence may include observation checklists, evaluation tools (self, peer), journal. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2, 3 and 4.*
20%	**Performance** Assessment of students engaged in an activity: on the spot evaluation of a performance. Managing, planning, interpreting and adapting aviation operations to ensure optimum performance. Types of evidence may include observation checklists, evaluation tools (self, peer), journal, portfolio. *Best suited to the collection of evidence on student achievement of Outcomes 2 and 3.*

UNIT 3AAVN

Unit description

The focus for this unit is on aviation concepts in the contexts related to **flying training: advanced aviation**. Students investigate the aerodynamic principles of Bernoulli, Coanda Effect and Newton, explore the disposition of forces in specific flight manoeuvres, investigate various types of aircraft stability and understand how aircraft are flown to achieve specific flight characteristics.

Students investigate different types of propeller design and their operating limitations, and supplementary propulsive devices fitted to reciprocating engines. They learn how to prepare a map for navigation and flight planning purposes and use radio navigation aids to supplement navigation. The theory of radio communication is examined and the practical application to flight explored. The interaction of weather on aviation operations and the rules regarding visibility are investigated.

Students become conversant with the legal requirements of pilot operations and flight within specified airspace. They explore the evolution of the supersonic airliner and its impact on society.

Unit learning contexts

Within the broad area of **flying training: advanced aviation**, teachers may choose one or more of the following contexts (this list is not exhaustive):

- flying training operations
- regular passenger transport
- domestic
- international
- logistical flights.

Unit content

This unit includes knowledge, understandings and skills with the degree of complexity described below:

Aerodynamics

Navigation

Terminology

- basic navigation terms including: heading, indicated air speed, calibrated airspeed, true air speed, wind velocity, track, ground speed, 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, fix, bearing and relative bearings, position lines and cross wind component.

Maps and documents

- maps and documents in air navigation: World Aeronautical Chart (WAC), Visual Terminal Chart (VTC), Visual Navigation Chart (VNT), Planning Chart Australia (PCA), En-Route Supplement Australia (ERSA) including Prohibited, Restricted and Danger areas (PRD), Country Airstrip Guide.

Basic navigation principles

- track and distance determination using appropriate navigation equipment
- estimating track and distance without equipment
- performing speed/time/distance/fuel flow calculations mentally and using flight computer
- conversions of units including feet/metres, nautical miles/kilometres, pounds/kilograms, US gallons/litres/kilograms of Avgas
- determining head/tailwind and crosswind components given a wind velocity and direction.

Air navigation

- use and limitation of the magnetic compass
- applying magnetic variation and deviation to the operation of the compass
- use of flight computer to calculate triangles of velocities, track and ground speed, conversion of calibrated air speed (CAS) to true air speed (TAS), time/distance/speed computations, head/tail/crosswind computations, fuel calculations, conversion of fuel volumes given specific gravity, 1-in-60 rule, density/height computations, altitude correction.

Time

- terms associated with time: Coordinated Universal Time (UTC), local mean time, local standard time, local summer time
- conversions between local mean time, UTC and local standard time
- effects of Earth's rotation and revolution around the Sun in relation to beginning and end of daylight and period of daylight
- effect of changes of longitude on local mean time.

Map projections

- properties associated with Mercator and Lamberts conformal conic projections
- difference between great circles and rhumb lines
- locating points on the Earth's surface using parallels of latitudes and meridians of longitude
- difference between geographic and magnetic poles
- magnetic variation and isogonal.

Principles of map reading

- map to ground, ground to map, topographical features, 10 minute markers.

Flight planning

- planning a flight and completing a flight plan with considerations given to route selection, cruising altitudes, departure time, weather, terrain aircraft performance, alternate aerodromes, beginning and end of daylight.

Meteorology

Atmospheric and general wind conditions

- divisions of the atmosphere and Earth's general wind circulation.

Stability, cloud and precipitation

- atmospheric stability and instability, adiabatic process, environmental lapse rate
- humidity, relative humidity, dew point temperature
- cloud formation processes
- classification of cloud types
- describing cloud cover measuring in OKTAs.

Pressure systems and wind

- variation in atmospheric pressure
- formation of pressure systems
- pressure systems terminology including high, low, medium, ridge, trough, col
- local winds including land and sea breezes, katabatic and anabatic winds, and fohn winds.

Air masses and fronts

- air masses affecting Australia
- synoptic charts interpretation
- weather associated with pressure systems
- frontal systems.

Hazardous weather

- occurrence and formation of thunderstorms, low cloud, fog (advection and radiation), poor visibility, turbulence, thermals, dust devils, wind shear, tropical cyclones
- effect of hazardous phenomena on safe aviation operations.

Aviation meteorological services

- terminology: interpretation of the following specific weather reports and forecasts: ARFOR, TAF, TTF, METAR, SPECI, SIGMET and AIRMET.

Climatology

- 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.

Aviation development

- current issues that affect aviation e.g. aerodrome noise abatement, RAAF aircraft acquisitions, ozone layer depletion, condensation trails, ageing workforce including Licensed Aircraft Maintenance Engineers (LAME) and Air Traffic Controllers
- future development of aviation in relation to current issues.

Assessment

The three types of assessment in the table below are consistent with the teaching and learning strategies considered to be the most supportive of student achievement of the outcomes in the Aviation course. The table provides details of the assessment type, examples of different ways that these assessment types can be applied and the weighting range for each assessment type.

Weighting Stage 3	Type of assessment
10%	**Investigation** Research work in which students plan and conduct an investigation. Investigations in relation to aviation principles, systems and structures, performance and operations, law and safety, exploring a range of primary and secondary sources. Types of evidence may include observation checklists, evaluation tools (self, peer,) journal, PowerPoint®, video, audio, written presentation. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2 and 4.*
70%	**Response** Students apply their knowledge and skills in responding to a series of stimuli or prompts. Response to, analysis and evaluation of an aviation issue or scenario. Types of evidence may include observation checklists, evaluation tools (self, peer), journal. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2, 3 and 4.*
20%	**Performance** Assessment of students engaged in an activity: on the spot evaluation of a performance. Managing, planning, interpreting and adapting aviation operations to ensure optimum performance. Types of evidence may include observation checklists, evaluation tools (self, peer), journal, portfolio. *Best suited to the collection of evidence on student achievement of Outcomes 2 and 3.*

UNIT 3BAVN

Unit description

The focus for this unit is on aviation concepts in the contexts related to **flying training: advanced aviation**. In this unit students further their understanding of aircraft operations and human limitations in relation to flight.

Students explore current types of propulsion used in commercial and military jet aircraft and investigate aerodynamic principles associated with subsonic and supersonic flight.

Students become conversant with an array of loading and performance charts used in the aviation industry and determine the legal requirements for loading and centre of gravity calculations. Specific aerodynamic principles to achieve specific flight characteristics are examined.

Students examine human physiology pertinent to flight and the cause and effects of inappropriate consumption of drugs and alcohol. Visual and physiological deficiencies and their implications for flight are also explored. They consider the effects of toxic substances and acceleration forces on flight crew, and issues associated with flight crew resource management.

Students explore current issues confronting commercial aviation throughout the world.

Unit learning contexts

Within the broad area of **flying training: advanced aviation**, teachers may choose one or more of the following contexts (this list is not exhaustive):

- flying training operations
- regular passenger transport.

Unit content

This unit includes knowledge, understandings and skills with the degree of complexity described below:

Aerodynamics

Rotary aerodynamics

- principles associated with helicopter operation including gyroscopic precession, retreating blade stall, coning, coriolis effect, tail rotor drift, autorotation
- forces acting on a helicopter in flight
- helicopter controls
- transition from one stage of flight to another.

Supersonic aerodynamics

- aerodynamic principles related to subsonic, transonic, supersonic and hypersonic flight regimes
- Mach Number and Critical Mach Number
- aerodynamic structures incorporated into the design of subsonic and supersonic aircraft.

Human factors

Physiology

- function of the respiratory and circulatory system
- causes, symptoms and remedies of hypoxia and hyperventilation
- causes and effects of decompression sickness after scuba diving and its relation to flight.

The ear

- basic physiology of the ear
- role of the semi-circular canals in visual meteorological conditions (VMC) and instrument meteorological conditions (IMC)
- physiological effects of noise
- effects and dangers of spatial disorientation.

The eye

- basic physiology of the eye
- standards and effects of visual acuity required of a pilot
- effects of myopia, hypermetropia, astigmatism, presbyopia, acceleration forces, dietary deficiencies, hypoxia, and carbon monoxide poisoning on visual acuity
- problems in flight associated with colour blindness, smoking, drugs and flicker vertigo on night vision
- pilot licence implications of colour blindness
- common visual illusions that affect aircrew.

Medical factors

- conditions leading to sudden incapacitation including heart attack, stroke, food poisoning
- causes and effects of fatigue in flight including noise and vibration
- effects of drugs including cannabis, amphetamines, opiates, aspirin, antihistamines and nasal decongestants, tranquilisers, sedatives, antibiotics and alcohol on aircrew performance
- causes and effects of dehydration
- effect of blood donations on aircrew performance.

Toxic substances

- sources, symptoms and effects of carbon monoxide poisoning, and the effect of breathing air contaminated by other noxious products including fuel.

Airsickness

- causes, symptoms and treatment for motion sickness.

G-LOC and acceleration forces

- effects on the human body due to positive and negative accelerations (G-forces)
- G-induced loss of consciousness (G-LOC) and methods of reducing adverse effects of G-LOC, such as pressure suits
- stages leading to G-LOC
- aircraft categories and/or types in which G-LOC is likely to occur.

Threat and error management (this should replace crew resource management)

- understanding of threat and error management (threats are external hazards and errors are those that crew members might commit)
- recognition of threats involves an understanding of the basic concepts associated with:
  - information processing
  - decision-making
  - situational awareness
  - effects of stress
  - personality traits
  - decision making processes
  - effects of fatigue
  - effects of ergonomic design
  - barriers to good communication
  - listening skills
  - assertion skills
  - judgement
  - leadership styles
  - culture of an organisation.

Aircraft accident review

- common causes of aircraft accidents.

Performance and operation

Radio navigation aids

- principle of operation, purpose and limitation of the automatic direction finder (ADF) and VHF omni-range (VOR)
- principle of operation, purpose and limitation of the distance measuring equipment (DME), inertial navigation system (INS), Global Positioning System (GPS), RADAR, secondary surveillance radar (SSR), instrument landing system (ILS), micro landing system (MLS), visual approach slope indicator system (VASIS) and Automatic Dependent Surveillance Broadcast (ADSB).

Emergency locator transmitter (ELT)

- emergency locator transmitter (ELT) frequencies
- purpose and function of the ELT.

Piper Turbo Lance

- use of Piper Turbo Lance take-off and landing charts to determine either distance required or maximum take-off or landing weight
- use of Piper Turbo Lance performance charts to determine fuel, time and distance to climb and descend, TAS, cruise power settings, rate of climb, and centre of gravity
- aerodynamic principles to achieve maximum endurance and range.

Aviation development

- evolution of air navigation techniques and electronic aids
- proposed future development of air navigation.

Assessment

The three types of assessment in the table below are consistent with the teaching and learning strategies considered to be the most supportive of student achievement of the outcomes in the Aviation course. The table provides details of the assessment type, examples of different ways that these assessment types can be applied and the weighting range for each assessment type.

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70%	**Response** Students apply their knowledge and skills in responding to a series of stimuli or prompts. Response to, analysis and evaluation of an aviation issue or scenario. Types of evidence may include observation checklists, evaluation tools (self, peer), journal. *Best suited to the collection of evidence on student achievement of Outcomes 1, 2, 3 and 4.*
20%	**Performance** Assessment of students engaged in an activity: on the spot evaluation of a performance. Managing, planning, interpreting and adapting aviation operations to ensure optimum performance. Types of evidence may include observation checklists, evaluation tools (self, peer), journal, portfolio. *Best suited to the collection of evidence on student achievement of Outcomes 2 and 3.*

Examination details
Stage 2 and Stage 3

Aviation
Written examination design brief
Stage 2

The Aviation examination comprises a written examination worth 80% of the total examination score and a practical (performance) examination worth 20% of the total examination score.

Time allowed
Reading time before commencing work: ten minutes
Working time for paper: two and a half hours

Permissible items
Standard items: pens, pencils, eraser, correction fluid, ruler, highlighters
Special items: non-programmable calculators

Section	Supporting information
Section One **Multiple-choice** 15–25% of the written examination 15–25 questions Suggested working time: 30 minutes	The questions cover a range of skills and content from units 2A and 2B.
Section Two **Short answer** 75–85% of the written examination 20–30 questions Suggested working time: 120 minutes	This section could include both open and closed questions. The questions could have sub-parts that increase in complexity, allowing the candidate to demonstrate depth of knowledge across the course. The questions could require answers comprising short paragraphs, dot points and diagrams. Wherever appropriate, the candidate should be encouraged to use examples and fully labelled sketch maps and diagrams to illustrate and support their responses. Where stimulus or support material is provided, it could include diagrams, short excerpts from journal articles, screen captures, photographs, maps and charts.

Aviation
Practical (performance) examination design brief
Stage 2

The Aviation examination comprises a written examination worth 80% of the total examination score and a practical (performance) examination worth 20% of the total examination score.

Time allocated
Preparation time: nil
Examination: flight simulation 20 minutes

Permissible items
To be provided by the supervisor: computer preloaded with *Microsoft* Flight Simulator 2004 (or later), *Logitech* Extreme 3D Pro joystick

Examination	Supporting information
20% of the total exam mark Duration: 20 minutes	The candidate is required to simulate a flying sequence in a Cessna 172 aircraft using *Microsoft* Flight Simulator 2004 or later. The sequence will comprise a series of non-aerobatic manoeuvres that can be legally accomplished in an actual Cessna 172 in the time allocated. The candidate will be assessed on their ability to complete the manoeuvres by complying with the examiner's instructions. These will be given in a manner similar to that expected from a Flight Instructor who is instructing in a real aircraft. If the candidate is unable to comply with any particular instruction, the marker will guide the candidate through the required action, but the candidate will not receive any marks for that part of the sequence. If, due to inaccurate manipulation, the candidate loses control of the aircraft or the aircraft moves outside the limits of the 'exercise area', the marker will assume control and return the aircraft to its correct attitude within the intended pattern. The candidate will not receive any additional penalty specific to the marker's intervention.

Aviation
Written examination design brief
Stage 3

The Aviation examination comprises a written examination worth 80% of the total examination score and a practical (performance) examination worth 20% of the total examination score.

Time allowed
Reading time before commencing work: ten minutes
Working time for paper: two and a half hours

Permissible items
Standard items: pens, pencils, eraser, correction fluid, ruler, highlighters
Special items: non-programmable calculators, navigation plotter (or ruler and protractor), flight computer

Section	Supporting information
Section One **Multiple-choice** 15–25% of the written examination 15–25 questions Suggested working time: 30 minutes	The questions cover a range of skills and content from units 3A and 3B.
Section Two **Short answer** 75–85% of the written examination 20–30 questions Suggested working time: 120 minutes	This section could include both open and closed questions. The questions could have sub-parts that increase in complexity, allowing the candidate to demonstrate depth of knowledge across the course. The questions could require answers comprising short paragraphs, dot points and diagrams. Wherever appropriate, the candidate should be encouraged to use examples and fully labelled sketch maps and diagrams to illustrate and support their responses. Where stimulus or support material is provided, it could include diagrams, short excerpts from journal articles, screen captures, photographs, maps and charts.

Aviation
Practical (performance) examination design brief
Stage 3

The Aviation examination comprises a written examination worth 80% of the total examination score and a practical (performance) examination worth 20% of the total examination score.

Time allocated
Preparation time: nil
Examination: flight simulation 20 minutes

Permissible items
To be provided by the supervisor: computer preloaded with *Microsoft* Flight Simulator 2004 (or later), *Logitech* Extreme 3D Pro joystick

Examination	Supporting information
20% of the total exam mark Duration: 20 minutes	The candidate is required to simulate a flying sequence in a Cessna 172 aircraft using *Microsoft* Flight Simulator 2004 or later. The sequence will comprise a series of non-aerobatic manoeuvres that can be legally accomplished in an actual Cessna 172 in the time allocated. The candidate will be assessed on their ability to complete the manoeuvres by complying with the examiner's instructions. These will be given in a manner similar to that expected from a Flight Instructor who is instructing in a real aircraft. If the candidate is unable to comply with any particular instruction, the marker will guide the candidate through the required action, but the candidate will not receive any marks for that part of the sequence. If, due to inaccurate manipulation, the candidate loses control of the aircraft or the aircraft moves outside the limits of the 'exercise area', the marker will assume control and return the aircraft to its correct attitude within the intended pattern. The candidate will not receive any additional penalty specific to the marker's intervention.

Appendix 1: Outcome Progressions

Outcome progressions

Outcome 1: Aviation systems **Understand components of, and interactions between aviation systems.**						
	Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**
	Students understand the components and interactions between components of simple systems.	Students understand the purpose of components and how specific systems interact.	Students understand limitations of components within systems and the interactions limiting operations.	Students understand integrated operation of components and systems, and the impact of variables on performance.	Students understand components of integrated systems are designed and adjusted to achieve optimal performance under changing conditions.	Students understand advanced integrated systems and how they operate to achieve optimal performance under changing conditions.
Students:						
• **understand the components of aviation systems.**	• understand the components of specific aviation systems *e.g. identify a primary control.*	• understand the purpose and function of components of specific aviation systems *e.g. purpose and operation of respiratory system.*	• understand the integration of systems within an aviation system, and the limitations of systems *e.g. fuel system is made up of carburettor, fuel tank, cylinders, switches and pumps and their limitations.*	• understand that complex aviation systems are an interaction of systems with purpose and limitations *e.g. entire propulsion system interacts with fuel, cooling, lubrication, electrical, ignition, propeller and environment systems.*	• understand that the design of complex aviation systems allows adjustment for optimum performance *e.g. fuel mixture control; use of oxygen/pressure suits.*	• understand components and systems in advanced integrated aviation systems and their limitations *e.g. supersonic aerodynamics: operation of the aerofoil through speed regimes, subsonic - hypersonic airflow and sonic boom.*
• **understand the interactions between aviation systems.**	• understand how a simple aviation system operates *e.g. state how an elevator operates to change pitch.*	• understand how specific aviation systems interact *e.g. aerodynamics related to changing pitch.*	• understand the interactions between aviation systems and operational limitations *e.g. endurance of an aircraft; manoeuvres that can be performed.*	• understand changing variables impact on the interrelationships between complex aviation systems *e.g. effects of air density on performance.*	• understand the impact of changing variables on interrelationships between aviation systems and how adjustments maintain optimal performances *e.g. adjustment of fuel/air ratio with altitude.*	• understand the impact and interrelationships of operation of advanced integrated systems with changing variables *e.g. the Stealth Bomber achieving stealth flight; high speed aerobatics.*

Outcome progressions

Outcome 2: Aviation operations **Students apply processes to plan aviation operations.**						
	Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**
	Students identify and apply information to an aviation operation.	Students collect information and develop plans for specified aviation operations.	Students apply knowledge to assess information for devising operational plans.	Students apply understandings to interpret information, formulate detailed plans, identifying changing variables and their possible impact.	Students apply operational understandings to analyse information and changing variables, formulating accurate and detailed plans with prepared alternatives.	Students evaluate valid operational information, predict impact of variables and prepare precise plans with appropriate alternatives.
Students:						
• **collect, organise and interpret operational information.**	• identify information for an aviation operation *e.g. measure distance; determine track.*	• collect appropriate information for aviation operations *e.g. pressure height.*	• apply knowledge to collect, organise and assess aviation operation information *e.g. collect information to generate simple flight plan; density height.*	• apply understandings to organise and interpret information and identify changing variables *e.g. interpret Arfor and gather information to generate multi-leg flight plan.*	• apply operational understandings to analyse information and the impacts of changing variables *e.g. interpret complex Arfors, TAFs, TTFs and other information to generate multi-leg flight plan.*	• evaluate valid operational information predicting the impact of changing variables *e.g. use aircraft charts to plan flight in unfamiliar aircraft; change in loading factors: heavy person vs. light person.*
• **plan aviation operations.**	• apply information to an aviation operation.	• apply information to develop plans for specified aviation operations *e.g. basic take off chart. Simple Whiz Wheel calculations - time, distance, speed.*	• apply knowledge of information to devise operational plans *e.g. simple flight plan adhering to hemispherical rules; no complex variables.*	• apply interpretation of information to formulate detailed operational plans, explaining how a change in variables may influence decisions *e.g. develop multi-leg flight plan.*	• apply operational understandings to formulate accurate and detailed plans, preparing alternatives based on changing variables *e.g. develop multi leg flight plan with alternatives.*	• formulate precise plans and prepare alternatives in anticipation of potential problems arising as a result of changing variables, justifying decisions *e.g. develop flight and performance plan for unfamiliar aircraft; re-work loading problem given unforseen circumstances; weight discrepancies.*

Outcome progressions

Outcome 3: Aviation applications **Students apply a range of skills and processes to perform specific aviation operations.**						
	Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**
	Students apply skills to attempt and maintain a simple aviation procedure.	Students apply skills to perform and maintain defined aviation procedures.	Students apply well developed skills to perform procedures and solve predictable problems.	Students apply aviation skills safely and effectively, monitoring and managing situations solving unpredictable problems.	Students perform a variety of aviation tasks, monitoring and analysing situations, implementing solutions to changing unpredictable problems safely and efficiently.	Students apply diverse aviation skills in a range of aviation operations, with situational awareness, implementing changes in courses of action safely and effectively.
Students:						
• **apply operational, organisational, and communication skills and processes appropriate to aviation operations.**	• apply an aviation skill to attempt a simple aviation procedure *e.g. turning without maintaining height.*	• apply defined aviation skills and processes involving a limited range of options, to carry out given aviation procedures *e.g. conducts climb; conducts turn.*	• apply aviation knowledge and well-developed skills and processes *e.g. conduct most manoeuvres for solo flight.*	• select from, and apply a range of specialist skills to perform aviation tasks safely and effectively *e.g. attained solo flight.*	• apply knowledge and understandings, appropriate technology and aviation skills to carry out aviation operations in a range of situations e.g. *attained GFPT.*	• use a wide range of specialist skills and knowledge to carry out aviation operations safely, efficiently and effectively *e.g. attained PPL.*
• **monitor and evaluate variables in aviation systems.**	• monitor and attempt to maintain simple aviation procedure *e.g. attempt to maintain height.*	• monitor situation to identify and achieve solutions to a limited range of predictable problems *e.g. maintain height; maintain airspeed in climb.*	• monitor a range of variables and resources to achieve solutions to a variety of predictable problems *e.g. monitor other traffic and aircraft performance.*	• monitor and interpret variables, selecting from a range of well-developed skills to solve a defined range of unpredictable problems.	• monitor variables and resources, making judgements based on the analysis of variables within aviation systems to solve problems or meet management requirements in a range of situations.	• evaluate a wide range of variables, applying initiative and commanding wide-ranging and highly-specialised skills and knowledge when planning alternative courses of action.
• **implement a course of action and manage resources.**	• attempt to apply a simple solution to a problem.	• apply known solutions to a limited range of predictable problems *e.g. regain height and airspeed.*	• apply known solutions to a variety of predictable problems *e.g. engine failure in the circuit.*	• use skills and knowledge to apply solutions to a defined range of unpredictable problems, managing resources effectively.	• deal with a variety of unpredictable problems while managing resources responsibly and efficiently.	• command wide-ranging, highly-specialised skills, knowledge, understandings and initiative to implement a modified course of action, managing resources efficiently and effectively.

Outcome progressions

Outcome 4: Aviation developments **Students understand the influences on aviation developments and their impact on society.**						
	Level 3	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**
	Students understand that aviation developments occur and are influenced by events and competing demands.	Students understand that aviation developments within a set time period result from competing demands, and impact on society.	Students understand how aviation developments in different time periods influence social change and are shaped by changing demands.	Students understand that developments are related to requirements of society, and how social trends are influenced by significant aviation industry developments.	Students understand how current trends in the aviation industry influence social trends and change, and how competing global demands influence change in the international aviation industry.	Students understand the interrelationships between the influence of current and future societal trends on aviation, and the influence of aviation on the world of the future.
Students:						
• **understand significant aviation developments and their impact on society.**	• understand a significant aviation development.	• understand aviation developments within a particular time and their impact on society at that time.	• understand aviation developments from different time periods and how their impact on society changed.	• understand that developmental trends in the aviation industry influence trends in society.	• understand current developmental trends in the aviation industry and how they relate to current and changing trends of society.	• understand how trends influence future aviation developments and their possible influences on future societies.
• **understand that significant aviation development is influenced by the needs of society.**	• understand how development has been influenced by demands of society.	• understand how demands of society have contributed to significant developments in the aviation industry.	• understand how changing demands of society have shaped developments in the aviation industry.	• understand how trends in society influence significant developments in the aviation industry.	• understand how competitive demands of society influence change in the aviation industry.	• understand how future trends of aviation development are influenced by the interrelationship between society and the aviation industry.