



Government of **Western Australia**  
School Curriculum and Standards Authority

# AVIATION

ATAR COURSE

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Year 11 syllabus

## **IMPORTANT INFORMATION**

This syllabus is effective from 1 January 2015.

Users of this syllabus are responsible for checking its currency.

Syllabuses are formally reviewed by the School Curriculum and Standards Authority on a cyclical basis, typically every five years.

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# Content

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<b>Rationale</b> .....	<b>1</b>
<b>Course outcomes</b> .....	<b>2</b>
<b>Organisation</b> .....	<b>3</b>
Structure of the syllabus .....	3
Organisation of content .....	4
Representation of the general capabilities .....	6
Representation of the cross-curriculum priorities .....	8
<b>Unit 1</b> .....	<b>9</b>
Unit description .....	9
Unit content .....	9
<b>Unit 2</b> .....	<b>12</b>
Unit description .....	12
Unit content .....	12
<b>School-based assessment</b> .....	<b>16</b>
Grading .....	17
<b>Appendix 1 – Grade descriptions Year 11</b> .....	<b>18</b>



## 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 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 ATAR course draws from such diverse disciplines as science, engineering, environmental science, the social sciences, 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 course provides students with the opportunity to investigate the importance of aviation to our society and learn the skills and knowledge required to make informed decisions on issues relating to aviation and associated industries.

The Aviation ATAR course caters for those students seeking a career in aviation, science or engineering.

## Course outcomes

The Aviation ATAR course is designed to facilitate achievement of the following outcomes.

### Outcome 1 – Aviation systems

Students understand components of, and interactions between, aviation systems.

In achieving this outcome, students:

- understand the components of aviation systems
- 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
- 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
- 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
- understand that significant aviation development is influenced by the needs of society.

## Organisation

This course is organised into a Year 11 syllabus and a Year 12 syllabus. The cognitive complexity of the syllabus content increases from Year 11 to Year 12.

### Structure of the syllabus

The Year 11 syllabus is divided into two units, each of one semester duration, which are typically delivered as a pair. The notional time for each unit is 55 class contact hours.

#### Unit 1

The focus for this unit is aviation concepts in contexts relating to general aviation.

Students investigate the aerodynamic principles associated with lift and drag, and the various types of aircraft stability. Students investigate aircraft controls and identify the six primary flight instruments, examining their purpose, operation and limitations. Students learn the basic principles of meteorology, navigation, maps and time. They are introduced to some human physiology pertinent to aviation.

In terms of aviation development, students study the development of the various facets of aviation since the first flight, including the factors driving the developments and their impact on society.

#### Unit 2

The focus for this unit is on aviation concepts in contexts related to flying training: general aviation.

Students explore the development and principles of the internal combustion aircraft engine, its use, instrumentation and limitations. They investigate fixed pitch propellers and various aircraft systems commonly found on light aircraft, the disposition of forces in specific flight manoeuvres. Students can use take-off and landing performance charts, and weight and balance charts, for a simple light aircraft (Cessna 172). Students understand aviation communications, including radios and radio wave propagation, light signals and ground symbols. They learn about flight rules and airspace classification. Students understand the purpose and necessity of civil aviation publications, and identify specific rules and regulations governing flight in and around controlled and uncontrolled aerodromes.

In aviation development, students study the structure of aviation in Australia today and the services provided. They also gain an understanding of the regulatory and support organisations servicing the aviation industry.

Each unit includes:

- a unit description – a short description of the focus of the unit
- unit content – the content to be taught and learned.

## Organisation of content

The course content is divided into five content areas:

- Aerodynamics
- Performance and operation
- Aviation skills
- 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 aircraft lifting and controlling forces (lift/drag formulas). The forces acting on an aircraft in subsonic phases of flight, turning, climbing, descending and cruise are explored, together with aircraft controls and their effects in the air, on the ground, stability and instability of aircraft and the ability of aircraft to manoeuvre.

### Performance and operation

#### 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.

#### 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.

#### 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, take-off 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 reviewed. Rules and regulations governing pilot operations are identified, and appropriate regulatory publications and documents used to extract this information.

## Aviation skills

The following skills are developed progressively across Years 11 and 12:

### Practical flight skills

- normal take-off and landing
- climb, descend, turns (Rate 1, 30, 45, 60 degrees)
- use of flaps
- entry and recovery from power off stall
- interpretation of the automatic direction finder (ADF), very high frequency (VHF) omnidirectional radio beacons (VOR), instrument landing system (ILS), visual approach slope guidance system, including visual approach slope indicator system (VASIS), T-VASIS and precision approach slope indicator (PAPI) and distance measuring equipment (DME)
- homing using an ADF and identification of Station Passage

### Process skills

- identify potential safety hazards
- communicate effectively with others in verbal or written forms
- record observations verbally and graphically
- research and extract relevant information
- make reliable measurements and record data accurately
- manipulate aviation navigation equipment to derive information necessary to complete flight plans

## Human factors

### 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. Tools, such as checklists, are utilised to self-assess an operation and one's ability to perform it.

Human factors are covered in Unit 2.

## 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 future trends of air travel.

The development of the physical structure and design of aircraft must take account of the stresses 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.

### Mathematical skills expected of students studying the Aviation ATAR course

The Aviation ATAR course requires students to use the mathematical skills they have developed through the Year 7–10 Mathematics curriculum.

It is assumed that students will be able to:

- perform calculations involving addition, subtraction, multiplication and division of quantities
- perform approximate evaluations of numerical expressions
- express fractions as percentages, and percentages as fractions
- calculate percentages
- recognise and use ratios
- substitute physical quantities into an equation using consistent units so as to calculate one quantity and check the dimensional consistency of such calculations
- solve simple algebraic equations
- translate information between graphical, numerical and algebraic forms
- construct and interpret frequency tables and diagrams, pie charts and histograms.

## Representation of the general capabilities

The general capabilities encompass the knowledge, skills, behaviours and dispositions that will assist students to live and work successfully in the twenty-first century. Teachers may find opportunities to incorporate the capabilities into the teaching and learning program for the Aviation ATAR course. The general capabilities are not assessed unless they are identified within the specified unit content.

### Literacy

Literacy is important in students' development of inquiry skills and their understanding of content related to aviation as a human enterprise. Students gather, interpret, synthesise and critically analyse information presented in a wide range of formats and representations (including text, flow diagrams, symbols, graphs and tables). They evaluate information sources and compare and contrast ideas, information and opinions presented within and between texts. They communicate processes and ideas logically and fluently and

structure evidence-based arguments, selecting genres and employing appropriate structures and features to communicate for specific purposes and audiences.

### **Numeracy**

Numeracy is key to students' ability to apply a wide range of inquiry skills, including making and recording observations; ordering, representing and analysing data; and interpreting trends and relationships. They employ numeracy skills to interpret complex spatial and graphic representations, and to appreciate the ways in which systems are structured, interact and change across spatial and temporal scales. They engage in analysis of data, including issues relating to reliability and probability, and they interpret and manipulate mathematical relationships to calculate and predict values.

### **Information and communication technology capability**

Information and communication technology (ICT) capability is a key part of aviation skills. Students use a range of strategies to locate, access and evaluate information from multiple digital sources; to collect, analyse and represent data; to model and interpret concepts and relationships; and to communicate and share science ideas, processes and information. Through exploration of aviation concepts, students assess the impact of ICT on the development of aviation, particularly with regard to collating, storing, managing and analysing large data sets.

### **Critical and creative thinking**

Critical and creative thinking is particularly important in the science inquiry process. Science inquiry, as it is applied in aviation, requires the ability to construct, review and revise questions and hypotheses about increasingly complex and abstract scenarios, and to design related investigation methods. Students interpret and evaluate data; interrogate, select and cross-reference evidence; and analyse processes, interpretations, conclusions and claims for validity and reliability, including reflecting on their own processes and conclusions. Science is a creative endeavour and students devise innovative solutions to problems, predict possibilities, envisage consequences and speculate on possible outcomes as they develop Science Understanding and Science Inquiry Skills. They also appreciate the role of critical and creative individuals and the central importance of critique and review in the development and innovative application of science.

### **Personal and social capability**

Personal and social capability is integral to a wide range of activities in aviation. Students develop and practise skills of communication, teamwork, decision-making, initiative-taking and self-discipline with increasing confidence and sophistication. In particular, students develop skills in both independent and collaborative investigation; they employ self-management skills to plan effectively, follow procedures efficiently and work safely; and they use collaboration skills to conduct investigations, share research and discuss ideas. Students also recognise the role of their own beliefs and attitudes in their response to issues and applications pertaining to aviation, and consider the perspectives of others.

## **Ethical understanding**

Ethical understanding is a vital part of science inquiry. Students evaluate the ethics of codes of practice, and the use of information and its applications. They explore what integrity means in an industry like aviation, and they understand, critically analyse and apply ethical guidelines in their investigations. They consider the implications of their investigations on others and the environment. They use scientific information to evaluate the claims and actions of others and to inform ethical decisions about a range of social, environmental and personal issues and applications of science.

## **Intercultural understanding**

Students appreciate the contributions of diverse cultures to developing and applying understanding, and the challenges of working in culturally diverse collaborations. They develop awareness that raising some debates within culturally diverse groups requires cultural sensitivity, and they demonstrate open-mindedness to the positions of others. Students also develop an understanding that cultural factors affect the ways in which aviation influences and is influenced by society.

## **Representation of the cross-curriculum priorities**

The cross-curriculum priorities address the contemporary issues which students face in a globalised world. Teachers may find opportunities to incorporate the priorities into the teaching and learning program for the Aviation ATAR course. The cross-curriculum priorities are not assessed unless they are identified within the specified unit content.

## **Aboriginal and Torres Strait Islander histories and cultures**

Students can appreciate the role of Aboriginal and Torres Strait Islander Peoples' knowledge in developing richer understandings of the nature of the Australian environment, for example, its physiography and its seasons.

## **Asia and Australia's engagement with Asia**

Contexts that draw on Asian scientific research and development, and collaborative endeavours in the Asia Pacific region, provide an opportunity for students to investigate Asia and Australia's engagement with Asia. Students examine the important role played by people of the Asia region in such areas as materials science, nanotechnology and energy security. They consider collaborative projects between Australian and Asian scientists and the contribution these make to scientific knowledge.

## **Sustainability**

In the Aviation ATAR course, the Sustainability cross-curriculum priority provides authentic contexts for exploring, investigating and understanding the function and interactions of physical systems. By investigating the relationships between physical systems and their system components, and how systems respond to change, students develop an appreciation for the ways in which interactions between matter and energy connect to affect the Earth's hydrosphere and atmosphere. Students appreciate that science and its applications provide the basis for decision making in many areas of society, and that these decisions can impact on the aviation industry. They understand the importance of using science to predict possible effects of human and other activity, such as the use of fossil fuels in order to develop management plans, alternative technologies or approaches, such as green chemistry, that minimise these effects and provide for a more sustainable future.

# Unit 1

## Unit description

The focus for this unit is aviation concepts in contexts relating to general aviation.

Students investigate the aerodynamic principles associated with lift and drag, and the various types of aircraft stability. Students investigate aircraft controls and identify the six primary flight instruments, examining their purpose, operation and limitations. Students learn the basic principles of meteorology, navigation, maps and time. They are introduced to some human physiology pertinent to aviation.

In terms of aviation development, students study the development of the various facets of aviation since the first flight, including the factors driving the developments and their impact on society.

## Unit content

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

### Aerodynamics

#### Principles of flight

- 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
- 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
- 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

### Performance and operation

#### Navigation, meteorology and radio communication

- concept of control and monitoring in three dimensions, requirements for visual flight, and additional requirements for flight in instrumental meteorological condition (IMC)

- 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
- navigation
  - 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:
    - automatic direction finder (ADF)
    - VHF omni-range (VOR)
    - 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)
- basic navigation principles
  - 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
  - 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
  - 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

## **Aviation skills**

### **Practical flight skills**

- use of Microsoft Flight Simulator – Cessna 172 to demonstrate general handling of aircraft including:
  - 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

### **Process skills**

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

## **Aviation development**

### **Aviation history and developmental influences**

- civilian and military aviation development since the Wright brothers' first flight, including:
  - technology (aircraft design, engines, avionics, all-weather ops)
  - impact on social and economic development

## Unit 2

### Unit description

The focus for this unit is on aviation concepts in contexts related to flying training: general aviation.

Students explore the development and principles of the internal combustion aircraft engine, its use, instrumentation and limitations. They investigate fixed pitch propellers and various aircraft systems commonly found on light aircraft, the disposition of forces in specific flight manoeuvres. Students can use take-off and landing performance charts, and weight and balance charts, for a simple light aircraft (Cessna 172). Students understand aviation communications, including radios and radio wave propagation, light signals and ground symbols. They learn about flight rules and airspace classification. Students understand the purpose and necessity of civil aviation publications, and identify specific rules and regulations governing flight in and around controlled and uncontrolled aerodromes.

In aviation development, students study the structure of aviation in Australia today and the services provided. They also gain an understanding of the regulatory and support organisations servicing the aviation industry.

### Unit content

This unit builds on the content covered in Unit 1.

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

#### Performance and operation

##### Navigation, meteorology and communication

- 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

### **Propulsion**

- 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

### **Aviation law**

- role of International Civil Aviation Organisation (ICAO)
- role of Civil Aviation Safety Authority (CASA)
- Australian aviation legislative framework and other documentation, including *Air Navigation Act 1920*, Air Navigation Orders, Aeronautical Information Publication, Civil Aviation Advisory Publications, Civil Aviation Regulations, Civil Aviation Safety Regulations, Civil Aviation Orders, Enroute Supplement Australia (ERSA)
- 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

## **Aircraft performance**

- 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)

## **Aviation skills**

### **Practical flight skills**

- use of Microsoft Flight Simulator – Cessna 172 to demonstrate general handling of aircraft including:
  - a normal take-off and climb
  - straight and level flight
  - climbing and descending
  - climbing and descending turns
  - medium turn, Rate 1 turn
  - trim for climb, descent and cruise attitude
  - a normal landing

### **Process skills**

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

### **Human factors**

- 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

## Aviation development

### Aviation history and developmental influences

- the structure of and services provided by aviation in Australia today, including:
  - airlines
  - charter
  - airwork (air freight, Royal Flying Doctor Service (RFDS), training, agricultural, coastal surveillance)
  - recreation
  - military
- support functions provided by:
  - CASA
  - airports
  - ground support (maintenance, catering, baggage handling)
  - air traffic control (ATC)
  - Rescue and Fire Fighting Services (RFFS)
  - meteorological services

## School-based assessment

The Western Australian Certificate of Education (WACE) Manual contains essential information on principles, policies and procedures for school-based assessment that needs to be read in conjunction with this syllabus.

Teachers design school-based assessment tasks to meet the needs of students. The table below provides details of the assessment types for the Aviation ATAR Year 11 syllabus and the weighting for each assessment type.

**Assessment table – Year 11**

Type of assessment	Weighting
<p><b>Investigation</b></p> <p>Students plan, conduct, process and interpret data; they evaluate their plan, procedures, data and findings; and communicate their conclusions.</p> <p>Types of evidence can include: validation exercises based on laboratory work, brief, formal investigation or laboratory report, report of literature search, exercises requiring qualitative and/or quantitative analysis of second-hand data, reports of simulated laboratory or flight activities, electronic, video or audio presentation of findings and recommendations, self- or peer-evaluation tools and observation checklists.</p>	10%
<p><b>Test</b></p> <p>Students apply knowledge and skills in aviation to analyse and interpret data, solve problems and answer questions in supervised classroom settings.</p> <p>These tasks require students to demonstrate use of terminology, understanding and application of concepts, quantitative skills, and knowledge of factual information, including aviation law.</p> <p>Types of evidence can include written or oral responses to: summative tests, comprehension and interpretation exercises, and exercises requiring analysis and evaluation of both qualitative and quantitative physical information.</p>	20%
<p><b>Examination</b></p> <p>Typically conducted at the end of each semester and/or unit. In preparation for Unit 3 and Unit 4, the examination should reflect the examination design brief included in the ATAR Year 12 syllabus for this course.</p>	50%
<p><b>Practical examination</b></p> <p>Typically conducted at the end of each semester and/or unit. In preparation for Unit 3 and Unit 4, the examination should reflect the examination design brief included in the ATAR Year 12 syllabus for this course.</p>	20%

Teachers are required to use the assessment table to develop an assessment outline for the pair of units (or for a single unit where only one is being studied).

The assessment outline must:

- include a set of assessment tasks
- include a general description of each task
- indicate the unit content to be assessed
- indicate a weighting for each task and each assessment type
- include the approximate timing of each task (for example, the week the task is conducted, or the issue and submission dates for an extended task).

In the assessment outline for the pair of units, each assessment type must be included at least twice. In the assessment outline where a single unit is being studied, each assessment type must be included at least once.

The set of assessment tasks must provide a representative sampling of the content for Unit 1 and Unit 2.

Assessment tasks not administered under test/controlled conditions require appropriate validation/authentication processes.

## Grading

Schools report student achievement in terms of the following grades:

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

The teacher prepares a ranked list and assigns the student a grade for the pair of units (or for a unit where only one unit is being studied). The grade is based on the student's overall performance as judged by reference to a set of pre-determined standards. These standards are defined by grade descriptions and annotated work samples. The grade descriptions for the Aviation ATAR Year 11 syllabus are provided in Appendix 1. They can also be accessed, together with annotated work samples, through the Guide to Grades link on the course page of the Authority website at [www.scsa.wa.edu.au](http://www.scsa.wa.edu.au)

To be assigned a grade, a student must have had the opportunity to complete the education program, including the assessment program (unless the school accepts that there are exceptional and justifiable circumstances).

Refer to the WACE Manual for further information about the use of a ranked list in the process of assigning grades.

## Appendix 1 – Grade descriptions Year 11

A

### Understanding and applying concepts

Synthesises broad and detailed concepts about aircraft systems, performance and operation, in a range of operational contexts, to solve problems.

Evaluates the validity of aviation information by comprehensively and accurately assessing the value of the evidence presented.

Demonstrates well-developed analytical thinking skills when exploring complex issues.

Organises material and presents clear and coherent arguments in detail and supported by evidence such as graphs, charts or diagrams.

Constructs clearly labelled graphs from the data provided, and uses appropriate charts to solve problems.

Logically and coherently communicates detailed information and concepts, using correct terminology and conventions.

### Investigation

Analyses a problem to identify significant issues and develop a plan of action.

Uses a broad range of resources to collect appropriate information, organises and uses this data effectively.

Recognises inconsistencies in data and suggests ways of reducing them.

### Performance

Effectively applies a range of skills when performing aviation tasks.

Demonstrates increasing independence when solving a range of unfamiliar problems.

B

### Understanding and applying concepts

Applies broad concepts about aircraft systems, performance and operation, in a range of operational contexts.

Evaluates the validity of aviation information by assessing the value of the evidence presented.

Demonstrates well-developed analytical thinking skills when exploring issues.

Organises material, and presents clear and coherent arguments supported by evidence such as graphs, charts or diagrams, in most instances.

Constructs clearly labelled graphs from the data provided.

Communicates information and concepts, using correct terminology and conventions.

### Investigation

Interprets a problem to identify issues of concern.

Uses a range of resources to collect appropriate information, organises and uses this data effectively.

Makes specific suggestions for improving the outcome in a given scenario.

### Performance

Applies a range of skills to perform aviation tasks.

Demonstrates increasing independence in most instances when solving a defined range of unfamiliar problems.

C

**Understanding and applying concepts**

Applies concepts about aircraft systems, performance and operation, in a range of operational contexts. With guidance, evaluates the validity of aviation information by assessing the value of the evidence presented.

Demonstrates analytical thinking skills when exploring issues.

Organises material and presents arguments, supporting key points with some evidence such as graphs, charts or diagrams.

Generally constructs clearly labelled graphs from the data provided.

Communicates information with some detail, using some correct terminology and conventions.

**Investigation**

Interprets a defined problem to identify issues of concern.

Uses some resources to collect information, organising and using this data appropriately.

Makes general suggestions for improving the outcome in a given scenario.

**Performance**

Applies general skills to perform aviation tasks.

Demonstrates some emerging independence and solves a range of familiar problems.

D

**Understanding and applying concepts**

Applies, with limitations, aspects of aircraft systems, performance and operation in a range of operational contexts.

Demonstrates limited evaluation of aviation information.

Demonstrates limited analytical thinking skills when exploring issues.

Comments on key features of reasoning, for example, comparisons, causes and examples.

Constructs simple graphs from the data provided.

Communicates information using simple terminology, but makes frequent errors in the use of conventions.

**Investigation**

With guidance, interprets a defined problem to identify issues of concern.

Collects limited information from resources provided.

Organises and uses this data ineffectively.

Makes a few suggestions for improving the outcome in a given scenario.

**Performance**

Performs aviation tasks relying on guidance and close supervision; applies a limited range of skills.

Demonstrates limited independence when addressing a defined range of problems.

E

Does not meet the requirements of a D grade and/or has completed insufficient assessment tasks to be assigned a higher grade.