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1 Rationale

The development of the aviation and aerospace industries has been one of the most exciting and challenging adventures in human history. In a single century, the technology of powered flight has progressed from a faltering flight of a few metres to giant machines efficiently carrying hundreds of passengers and cargo non-stop halfway around the planet. Today, military aircraft routinely conduct missions with pinpoint accuracy, often at supersonic speeds. Satellite technology facilitates instant global communication, and the Earth and the rest of the universe are being surveyed in ever-increasing detail.

Government has identified aviation as a priority industry, and Queensland’s aerospace industry is consequently experiencing rapid and significant growth. Aircraft manufacturers, aerospace companies and airlines have established aircraft construction, maintenance, operations and training centres in Queensland to meet the projected increased demand for aviation and aerospace services. Meanwhile, projects at Australian universities and research centres represent the cutting edge of aerospace technology. These activities demand well-qualified, technologically literate personnel. People planning careers in aviation and aerospace should anticipate the need to be flexible, adaptable, creative and innovative in a dynamic, highly competitive environment.

This syllabus provides students with an opportunity to gain an understanding of the underlying concepts and principles of aviation and aerospace. A course developed from this syllabus will combine elements of many disciplines — including Mathematics, Physics, English, Information and Communications Technologies, Business, Engineering, History and Law — and promotes a positive interest in the aviation/aerospace industry as a whole. Aerospace Studies provides a firm foundation of knowledge relevant to an array of career pathways and further education and training.

Authentic learning is an important aspect of Aerospace Studies and is enhanced when schools establish strong industry links and relationships. This also provides students with real-life contexts that assist them in career choices.

In this syllabus document the words “aviation” and “aerospace” are used frequently. They are not mutually exclusive. “Aviation” covers the design, development, manufacture and operation of aircraft and the science of powered flight. “Aerospace” refers to the technology and industry involving research, design, manufacture and operation of vehicles that move through air and space.
2 Dimensions and objectives

The dimensions are the salient properties or characteristics of distinctive learning for this subject. The dimensions are described through their objectives and it is these that schools are required to teach and that students should have the opportunity to learn. The objectives describe what students should be able to do by the end of the course of study.

Progress in a particular dimension may depend on the qualities and skills developed in other dimensions. Learning through each of the dimensions must be developed in increasing complexity and sophistication over a four-semester course.

Schools must assess how well students have achieved the objectives. The standards have a direct relationship with the objectives, and are described in the same dimensions as the objectives.

The dimensions for a course in this subject are:

- Dimension 1: Knowledge and understanding
- Dimension 2: Interpretation and communication
- Dimension 3: Critical thinking.

2.1 Dimension 1: Knowledge and understanding

Knowledge and understanding refers to comprehending and demonstrating the concepts and principles associated with aerospace contexts and theory. This dimension also encompasses the explanation of these concepts and principles. Explaining goes beyond a definition by providing sufficient information so that a person outside the industry will understand the meaning. The explanation may incorporate the use of examples.

Knowledge refers to the ability to identify, recall, describe and use the factual information, rules, regulations, mathematical processes, technical terms and principles of the aerospace areas of study and the contexts in which they are developed.

Understanding refers to the ability to explain the meaning of concepts, principles, processes, procedures, rules and regulations relevant to aerospace.

2.1.1 Objectives

By the conclusion of the course of study, students should:

- identify and describe aerospace and aviation technical terms and principles
- recall and use rules, regulations, procedures and mathematical processes
- explain technical concepts, processes, procedures, rules and regulations.
2.2 Dimension 2: Interpretation and communication

Interpretation and communication refers to gathering aerospace and aviation information and/or data from a range of sources, interpreting and applying information and/or data for a purpose and communicating that information to convey meaning.

Interpretation refers to making meaning of information and/or data by identifying the relationship/s between things and/or the significance of parts or all of the information and/or data. Applying refers to the use of concepts, principles, processes, procedures, rules and regulations for a specific purpose.

Communication skills are used to present information suitable to the purpose and audience, using modes (including written, spoken and multimodal), genres (including the format for a written report using referencing) and language conventions (including vocabulary, spelling, punctuation, grammar and sentence construction).

2.2.1 Objectives

By the conclusion of the course of study, students should:

- select and organise information and/or data
- interpret and apply concepts, principles, processes, procedures, rules and regulations
- communicate using mode, genre and language conventions to convey meaning.

2.3 Dimension 3: Critical thinking

Critical thinking refers to the use of higher-order cognitive skills of analysis and evaluation, taking into account regulatory or procedural guidelines, to make decisions, reach conclusions, solve problems and justify recommendations and/or solutions associated with aerospace and aviation contexts.

Analysis refers to dissecting information and/or data to ascertain and examine constituent parts and/or their relationships.

Evaluation refers to assigning merit according to criteria.

2.3.1 Objectives

By the conclusion of the course of study, students should:

- analyse information and/or data from technical, operational, regulatory and historical sources to develop arguments
- evaluate problems, issues and challenges to devise recommendations and/or solutions
- justify recommendations and/or solutions.
3 Course organisation

3.1 Course overview

3.1.1 Structure of course

A course in Aerospace Studies encompasses a wide range of subject matter and must include, in each year of the course of study:

- two to four contextualised units that are developed through the four areas of study
- representation and integration of each of the four areas of study.

Across the course of study, there should be a balance of focus on categories of subject matter within each area of study.

The areas of study stipulate the core subject matter to be studied. Areas of study may be extended beyond the minimum hours through in-depth study of categories of subject matter.

The areas of study are interconnected. Each contextualised unit must draw on subject matter from at least two of the areas of study. The emphasis on each area of study will vary between each contextualised unit.

The course of study and learning experiences are strengthened by the school establishing and maintaining industry links.

Table 1: Course overview

<table>
<thead>
<tr>
<th>Areas of study</th>
<th>Categories of subject matter</th>
<th>Minimum hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeronautics and astronautics</td>
<td>Basic aeronautics</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Aircraft systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meteorology</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Historical and technological development of aerospace</td>
<td></td>
</tr>
<tr>
<td>Aviation operations</td>
<td>Airport and airline operations</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Air traffic management</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Environmental factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human factors</td>
<td></td>
</tr>
<tr>
<td>Safety management systems</td>
<td>Safety awareness and risk management</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Regulations, legislation, policies and associated procedures</td>
<td></td>
</tr>
<tr>
<td>The business of aviation and aerospace</td>
<td>Organisational structure</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Business development</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human resource management</td>
<td></td>
</tr>
</tbody>
</table>
3.1.2 Contexts

Contextualised units provide students with opportunities to learn in circumstances that are relevant and interesting to them and are used to bring aspects of the areas of study together in real-world scenarios. Contextualised units provide meaningful frameworks for the development of learning experiences.

A contextualised unit:

- has relevance and consequence beyond the classroom, especially to aerospace work or industry circumstances
- is grounded in the subject matter from the selected areas of study.

A contextualised unit should also:

- reflect the interests and needs of students
- be topical and current
- have technological, scientific, environmental, business and/or historical importance.

It can be developed using:

- a key question or series of questions
- investigation/s
- hypotheses to be tested
- a problem or problems to be solved
- design challenges
- topical, interesting issues to be researched.

In the development of contextualised units, schools should consider student population, school resources, industry partnerships, local environments and social and technological implications and issues. The assessment for the unit should be derived from the learning experiences developed around the context basis of the unit and the corresponding subject matter drawn from the areas of study.

Diagram 1: Relationship between areas of study, categories of subject matter and contexts
### 3.1.3 Areas of study

**Table 2: Core subject matter for each of the areas of study**

<table>
<thead>
<tr>
<th>Area of study</th>
<th>Aeronautics and astronautics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focus of study</strong></td>
<td>A basic understanding of aerodynamics and flight is essential for any person engaged in the aerospace and aviation industries. Aircraft are complex machines with many interconnected and interdependent systems. Weather and atmospheric conditions affect aviation operations. The technology of aerospace and astronautics has advanced swiftly over a relatively short period in history.</td>
</tr>
<tr>
<td><strong>Core subject matter</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Basic aeronautics</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Types and parts of aircraft</td>
<td></td>
</tr>
<tr>
<td>▪ Basic aerodynamics</td>
<td></td>
</tr>
<tr>
<td>- physics of flight</td>
<td></td>
</tr>
<tr>
<td>- lift, weight, thrust and drag</td>
<td></td>
</tr>
<tr>
<td>- lift and drag equations</td>
<td></td>
</tr>
<tr>
<td>- fluid flow</td>
<td></td>
</tr>
<tr>
<td>- lift principles</td>
<td></td>
</tr>
<tr>
<td>▪ Stability and control</td>
<td></td>
</tr>
<tr>
<td>▪ Navigation</td>
<td></td>
</tr>
<tr>
<td>- instruments</td>
<td></td>
</tr>
<tr>
<td>- charts</td>
<td></td>
</tr>
<tr>
<td>- procedures</td>
<td></td>
</tr>
<tr>
<td><strong>Aircraft systems</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Propulsion</td>
<td></td>
</tr>
<tr>
<td>▪ Avionics</td>
<td></td>
</tr>
<tr>
<td>▪ Fuel</td>
<td></td>
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<tr>
<td>▪ Electrics</td>
<td></td>
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<tr>
<td>▪ Hydraulics</td>
<td></td>
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<tr>
<td>▪ Pneumatics</td>
<td></td>
</tr>
<tr>
<td><strong>Meteorology</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Meteorological conditions</td>
<td></td>
</tr>
<tr>
<td>- precipitation</td>
<td></td>
</tr>
<tr>
<td>- wind</td>
<td></td>
</tr>
<tr>
<td>- cloud and fog</td>
<td></td>
</tr>
<tr>
<td>- icing</td>
<td></td>
</tr>
<tr>
<td>- thunderstorms</td>
<td></td>
</tr>
<tr>
<td>▪ Synoptic charts and forecasting</td>
<td></td>
</tr>
<tr>
<td>(TAF, METAR and ARFOR)</td>
<td></td>
</tr>
<tr>
<td><strong>Historical and technological developments of aerospace</strong></td>
<td></td>
</tr>
<tr>
<td>▪ Evolution of aircraft</td>
<td></td>
</tr>
<tr>
<td>▪ Pioneers</td>
<td></td>
</tr>
<tr>
<td>▪ Development of aerospace industries</td>
<td></td>
</tr>
<tr>
<td>▪ Space</td>
<td></td>
</tr>
<tr>
<td>▪ Future developments</td>
<td></td>
</tr>
</tbody>
</table>
**Focus of study**
An understanding of the operation of aircraft from and around airports and their operation across national and international airspace is important for any person engaged in the aerospace and aviation industries. An aviation operation is a complex dynamic that demands efficiency and professionalism of its personnel and management at all levels. Air traffic management in airspace around airports and elsewhere is necessary for safe and efficient aviation operations. The impact of aircraft operations on the environment is important to the viability of the industry and the health of the planet. Consideration of human factors within increasingly automated aviation operations is a vital element of safe and efficient air travel.

### Core subject matter

#### Airport and airline operations
- Airport design and infrastructure
  - Civil Aviation Safety Regulations Manual of Standards, part 139
- Landside operations
  - check-in
  - dispatch
  - ancillary services
- Airside operations
  - ramp management
  - baggage
- Airlines
  - domestic
  - international
  - low cost
  - freight
  - air taxi
  - charter
  - commercial air work
- General and recreational aviation

#### Air traffic management
- Air traffic management
- Airservices Australia
  - visual flight rules (VFR)
  - instrument flight rules (IFR)
  - radar control
  - non-radar control
  - towers
- International Phonetic Alphabet
- Aeronautical information publications (AIP)
- Flight planning

#### Environmental factors
- Noise abatement
- Pollution and carbon emissions
- Impact on natural habitats
- Birdstrike and other hazards
- Recycling
- Foreign Objects Damage (FOD)

#### Human factors
- Human performance limitations
  - biological factors
  - cognitive factors
  - interpersonal relationships
- Crew Resource Management (CRM) and Threat and Error Management (TEM)
- Human error
- Effective communication
- Management decisions that affect safety outcomes
<table>
<thead>
<tr>
<th>Area of study</th>
<th>Safety management systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus of study</td>
<td>Everyone involved in the production, maintenance or operation of aircraft, either directly or indirectly, bears a responsibility to be aware of safety issues, and to put into effect appropriate safe practices. A culture of safety is fundamental to the aviation and aerospace industries. Maintenance of safety management systems and development of procedures in accordance with operational and legislative requirements is vital to all areas of aerospace.</td>
</tr>
</tbody>
</table>

**Core subject matter**

**Safety awareness and risk management**
- Safety management systems
  - aviation safety concepts
  - training procedures and techniques
  - reporting culture and mechanisms
- Risk management
  - risk identification
  - risk analysis
  - strategies for managing or mitigating risk
  - monitoring and review
  - balance between safety issues and business
  - communication and consultation
- Standard operating procedures (SOP)

**Regulations, legislation and policies**
- Aviation law
- Aviation authorities (e.g. CASA, ICAO, Australian and state governments)
- Regulations (e.g. Defence Act 1903, Civil Aviation Act 1988)
<table>
<thead>
<tr>
<th>Area of study</th>
<th>The business of aviation and aerospace</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Focus of study</strong></td>
<td>Knowledge of the business models of aviation and aerospace is necessary for any person engaged in the industry. Aviation and aerospace are multi-billion dollar global industries involving businesses that vary in size from multinational corporations to small local concerns. These highly competitive industries are influenced by governments and their agencies, world events, societal conditions and the global economy. In order to operate successfully, businesses must face the challenge of dealing with these influences and manage their human resources while remaining profitable.</td>
</tr>
<tr>
<td><strong>Core subject matter</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Organisational structure</strong></td>
<td>• Types of business structures (i.e. public versus private ownership)</td>
</tr>
<tr>
<td></td>
<td>• Division of labour</td>
</tr>
<tr>
<td></td>
<td>• Departmentalisation</td>
</tr>
<tr>
<td></td>
<td>• Delegation</td>
</tr>
<tr>
<td></td>
<td>• Chain of command</td>
</tr>
<tr>
<td></td>
<td>• Communication flow</td>
</tr>
<tr>
<td></td>
<td>• Organisational charts</td>
</tr>
<tr>
<td><strong>Business development</strong></td>
<td>• How the industry operates (aerospace support, airport and airline management)</td>
</tr>
<tr>
<td></td>
<td>- general and recreational aviation</td>
</tr>
<tr>
<td></td>
<td>- flight training and education</td>
</tr>
<tr>
<td></td>
<td>- regional carriers</td>
</tr>
<tr>
<td></td>
<td>- major carriers</td>
</tr>
<tr>
<td></td>
<td>• Marketing mix</td>
</tr>
<tr>
<td></td>
<td>- product (differentiation, branding, economy/business/first class, freight, type and size of aircraft)</td>
</tr>
<tr>
<td></td>
<td>- price (airline pricing strategies, discount fares)</td>
</tr>
<tr>
<td></td>
<td>- place (domestic/international, travel agencies, internet selling)</td>
</tr>
<tr>
<td></td>
<td>- promotion (advertising and promotional strategies)</td>
</tr>
<tr>
<td></td>
<td>• Customer relations</td>
</tr>
<tr>
<td></td>
<td>• Systems engineering management philosophy</td>
</tr>
<tr>
<td></td>
<td>- industry application of systems engineering</td>
</tr>
<tr>
<td></td>
<td>• Globalisation of aerospace industries</td>
</tr>
<tr>
<td><strong>Human resource management</strong></td>
<td>• Job design, job analysis</td>
</tr>
<tr>
<td></td>
<td>• Workforce planning</td>
</tr>
<tr>
<td></td>
<td>• Performance appraisal</td>
</tr>
<tr>
<td></td>
<td>• Training and development</td>
</tr>
<tr>
<td></td>
<td>• Roles and occupations</td>
</tr>
<tr>
<td></td>
<td>• Career pathways</td>
</tr>
<tr>
<td></td>
<td>• Industrial relations</td>
</tr>
</tbody>
</table>
3.1.4 Time allocation

The minimum number of hours of timetabled school time, including assessment, for a course of study developed from this syllabus is 55 hours per semester. A course of study will usually be completed over four semesters (220 hours).

3.2 General capabilities

Students require a number of skills and dispositions in preparation for life and work in the 21st century. The *Melbourne Declaration on Educational Goals for Young Australians* sees these as including “planning and organising, the ability to think flexibly, to communicate well and to work in teams … the capacity to think creatively, innovate, solve problems and engage with new disciplines”. The Australian Curriculum identified seven general capabilities for their entitlement curriculum. These are:

- literacy
- numeracy
- information and communication technology (ICT) competence
- critical and creative thinking
- personal and social competence
- ethical behaviour
- intercultural understanding.

It is the responsibility of teachers to continue to develop the general capabilities established in the Prep to Year 10 Learning areas that are appropriate to Aerospace Studies.

3.3 Educational equity

Equity means fair treatment of all. In developing work programs from this syllabus, schools need to provide opportunities for all students to demonstrate what they know and what they can do. All students, therefore, should have equitable access to educational programs and human and material resources.


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3.4 Aboriginal and Torres Strait Islander perspectives

The Queensland Studies Authority (QSA) recognises Aboriginal and Torres Strait Islander peoples, their traditions, histories and experiences from before European settlement and colonisation through to the present time. To strengthen students’ appreciation and understanding of the first peoples of the land, opportunities exist in the syllabus to encourage engagement with Aboriginal and Torres Strait Islander:

- frameworks of knowledge and ways of learning
- contexts in which Aboriginal and Torres Strait Islander peoples live
- contributions to Australian society and cultures.


3.5 Resources

The resources to support the implementation of this syllabus are available from the Aerospace Studies page of the QSA website <www.qsa.qld.edu.au/5678.html>.

3.5.1 Work program requirements

A work program is the school’s plan of how the course will be delivered and assessed, based on the school’s interpretation of the syllabus. It allows for the special characteristics of the individual school and its students. Work program requirements, checklists and samples are available on the Aerospace Studies subject page of the QSA website. Instructions for online submission of work programs are available from <www.qsa.qld.edu.au/wponline>.

3.5.2 Composite classes

This syllabus enables teachers to develop a course that caters for a variety of ways to organise learning, such as combined Years 11 and 12 classes, combined campuses, or modes of delivery involving periods of student-managed study. This resource provides guidelines about composite classes.

3.5.3 Reference materials

This resource provides links to reference materials, text and reference books, websites, newspaper reports, periodicals, electronic media and learning technology, and organisations and community resources for the subject.

3.5.4 Learning experiences and sample units of work

This resource provides guidelines for learning experiences and units of work, along with sample units of work.

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3 The Queensland Government has a vision that Aboriginal and Torres Strait Islander Queenslanders have their cultures affirmed, heritage sustained and the same prospects for health, prosperity and quality of life as other Queenslanders. The QSA is committed to helping achieve this vision and encourages teachers to include Aboriginal and Torres Strait Islander perspectives in the curriculum.
4 Assessment

Assessment is an integral part of the teaching and learning process. For Years 11 and 12 it is the purposeful, systematic and ongoing collection of information about student learning outlined in the senior syllabuses.

In Queensland, assessment is standards based. The standards for each subject are described in dimensions, which identify the valued features of the subject about which evidence of student learning is collected and assessed. The standards describe the characteristics of student work.

The major purposes of assessment in senior Authority subjects are to:

- promote, assist and improve learning
- inform programs of teaching and learning
- advise students about their own progress to help them achieve as well as they are able
- give information to parents and teachers about the progress and achievements of individual students to help them achieve as well as they are able
- provide comparable levels of achievement in each Authority subject which may contribute credit towards a Queensland Certificate of Education
- provide base data for tertiary entrance purposes
- provide information about how well groups of students are achieving for school authorities and the State Education and Training Minister.

4.1 Principles of exit assessment

All the principles of exit assessment must be used when planning an assessment program and must be applied when making decisions about exit levels of achievement.

A standards-based assessment program for the four-semester course of study requires application of the following interdependent principles:

- information is gathered through a process of continuous assessment, i.e. continuous assessment
- balance of assessment is a balance over the course of study and not necessarily a balance over a semester or between semesters, i.e. balance
- exit achievement levels are devised from student achievement in all areas identified in the syllabus as being mandatory, i.e. mandatory aspects of the syllabus
- assessment of a student’s achievement is in the significant aspects of the course of study identified in the syllabus and the school’s work program, i.e. significant aspects of the course of study
- selective updating of a student’s profile of achievement is undertaken over the course of study, i.e. selective updating
- exit assessment is devised to provide the fullest and latest information on a student’s achievement in the course of study, i.e. fullest and latest.

While most students will exit a course of study after four semesters, some will exit after one, two or three semesters.
4.1.1 Continuous assessment

Judgments about student achievement made at exit from a course of study must be based on an assessment program of continuous assessment.

Continuous assessment involves gathering information on student achievement using assessment instruments administered at suitable intervals over the developmental four-semester course of study.

In continuous assessment, all assessment instruments have a formative purpose — to improve teaching and student learning and achievement.

When students exit the course of study, teachers make a summative judgment about their levels of achievement in accordance with the standards matrix.

The process of continuous assessment provides the framework in which the other five principles of exit assessment operate: balance, mandatory aspects of the syllabus, significant aspects of the course, selective updating, and fullest and latest information.

4.1.2 Balance

Judgments about student achievement made at exit from a course of study must be based on a balance of assessments over the course of study.

Balance of assessments is a balance over the course of study and not a balance within a semester or between semesters.

Balance of assessments means judgments about students’ achievements of all the dimensions are made a number of times using a variety of assessment techniques and a range of assessment conditions over the developmental four-semester course.

See also Section 4.6 Requirements for verification folio.

4.1.3 Mandatory aspects of the syllabus

Judgments about student achievement made at exit from a course of study must be based on mandatory aspects of the syllabus.

The mandatory aspects are:

- the objectives of the dimensions Knowledge and understanding, Interpretation and communication and Critical thinking
- the four areas of study — aeronautics and astronautics, aviation operations, safety management systems, and the business of aviation and aerospace.

To ensure that the judgment of student achievement at exit from a four-semester course of study is based on the mandatory aspects, the exit standards for the dimensions stated in the standards matrix (refer to Section 4.8.2) must be used.

4.1.4 Significant aspects of the course of study

Judgments about student achievement made at exit from a course of study must be based on significant aspects of the course of study.

Significant aspects are those areas described in the school’s work program that have been selected from the choices permitted by the syllabus to meet local needs.

The significant aspects must be consistent with the objectives of the syllabus and complement the developmental nature of learning in the course over four semesters.
4.1.5 **Selective updating**

Judgments about student achievement made at exit from a course of study must be selectively updated throughout the course.

Selective updating is related to the developmental nature of the course of study and works in conjunction with the principle of fullest and latest information.

As subject matter is treated at increasing levels of complexity, assessment information gathered at earlier stages of the course may no longer be representative of student achievement. Therefore, the information should be selectively and continually updated (not averaged) to accurately represent student achievement.

Schools may apply the principle of selective updating to the whole subject-group or to individual students.

**Whole subject-group**

A school develops an assessment program so that, in accordance with the developmental nature of the course, later assessment information based on the same groups of objectives replaces earlier assessment information.

**Individual students**

A school determines the assessment folio for verification or exit (post-verification). The student’s assessment folio must be representative of the student’s achievements over the course of study. The assessment folio does not have to be the same for all students; however, the folio must conform to the syllabus requirements and the school’s approved work program.

Selective updating must not involve students reworking and resubmitting previously graded responses to assessment instruments.

4.1.6 **Fullest and latest information**

Judgments about student achievement made at exit from a course of study must be based on the fullest and latest information available.

- “Fullest” refers to information about student achievement gathered across the range of objectives.
- “Latest” refers to information about student achievement gathered from the most recent period in which achievement of the objectives is assessed.

As the assessment program is developmental, fullest and latest information will most likely come from Year 12 for those students who complete four semesters of the course.

The fullest and latest assessment data on mandatory and significant aspects of the course of study is recorded on a student profile.

4.2 **Planning an assessment program**

To achieve the purposes of assessment listed at the beginning of this section, schools must consider the following when planning a standards-based assessment program:

- dimensions and objectives (see Section 2)
- course organisation (see Section 3)
- principles of exit assessment (see Section 4.1)
- variety in assessment techniques over the four-semester course (see Section 4.5)
- conditions in which assessment instruments are undertaken (see Section 4.5)
verification folio requirements, i.e. the range and mix of assessment instruments necessary to reach valid judgments of students’ standards of achievement (see Section 4.6)

post-verification assessment (see Section 4.6.1)

exit standards (see Section 4.7).

In keeping with the principle of continuous assessment, students should have opportunities to become familiar with the assessment techniques that will be used to make summative judgments.

Further information can be found on the Aerospace Studies page of the QSA website <www.qsa.qld.edu.au/5678.html>.

### 4.3 Special provisions

Guidance about the nature and appropriateness of special provisions for particular students may be found in the QSA’s Policy on Special Provisions for School-based Assessments in Authority and Authority-registered Subjects (2009), available from <www.qsa.qld.edu.au/2132.html>.

This statement provides guidance on responsibilities, principles and strategies that schools may need to consider in their school settings.

To enable special provisions to be effective for students, it is important that schools plan and implement strategies in the early stages of an assessment program and not at the point of deciding levels of achievement. The special provisions might involve alternative teaching approaches, assessment plans and learning experiences.

### 4.4 Authentication of student work

It is essential that judgments of student achievement be made on accurate and genuine student assessment responses. Teachers should ensure that students’ work is their own, particularly where students have access to electronic resources or when they are preparing collaborative tasks.

The A–Z of Senior Moderation contains a section on authenticating student work <www.qsa.qld.edu.au/1426.html>. This provides information about various methods teachers can use to monitor that students’ work is their own. Particular methods outlined include:

- teachers seeing plans and drafts of student work
- student production and maintenance of documentation for the development of responses
- student acknowledgment of resources used.

Teachers must ensure students use consistent accepted conventions of in-text citation and referencing, where appropriate.


### 4.5 Assessment techniques

The techniques and associated conditions of assessment most suited to the judgment of student achievement in this subject are described in the following sections. The dimensions to which each technique is best suited are also indicated.

For each dimension, standards are described. Schools decide the instruments to be used for assessment. For each assessment instrument, schools develop instrument-specific standards from the syllabus standards descriptors for relevant dimensions (see Section 4.8.2 Standards matrix). These instrument-specific standards are used for making judgments about the quality of students’ responses. Students must be given instrument-specific standards for each assessment instrument.
Where students undertake assessment in a group or team, instruments must be designed so that teachers can validly assess the work of individual students and not apply a judgment of the group product and processes to all individuals.

4.5.1 Supervised written

**Purpose**

This technique assesses a range of cognition through written responses produced independently, under supervision and in a set timeframe to ensure authenticity.

**Description**

- A supervised assessment may include one or more items.
- Conditions must be explained on the assessment instrument.
- Items will be in response to questions or statements. Questions or statements are typically unseen. If seen, teachers must ensure the purpose of this technique is not compromised.
- Stimulus materials may also be used. Stimulus materials may be seen or unseen.
- Unseen questions, statements or stimulus materials should not be copied from information or texts that students have previously been exposed to or have directly used in class.

**Dimensions to be assessed**

Supervised written assessments are best used to determine student achievement in objectives from:

- Knowledge and understanding
- Interpretation and communication
- Critical thinking.

**Types of items that could be included**

**Extended written response**

- Items require sustained analysis and evaluation to fully answer a problem, question or hypothesis.
- Students provide a response to a seen or unseen question or statement, and seen or unseen supplied sources/stimuli.
- The response could be an analytical exposition format/genre.

If an extended piece of writing is chosen, it is best if it is the only item, as this will better allow students to demonstrate the full range of standards.

**Short responses**

Short response items may comprise some or all of the item types below.

- Prose — Items may include response to stimulus activities that require:
  - explanations longer than one sentence
  - ideas maintained, developed and justified
  - full sentence responses, constructing a piece of prose that may have one or several paragraphs.
• Practical exercises and calculations — Items may require students to:
  - construct, use, interpret or analyse primary or secondary data, graphs, tables or diagrams
  - apply algorithms or demonstrate mathematical calculations and problem solving.

• Questions — Items may also include multiple-choice, single-word, true/false, or sentence answers. These types of questions are useful for assessing content knowledge and are difficult to construct if trying to elicit meaningful high-order cognitive responses.

Further guidance
A supervised written assessment may be open book. In this case, the assessment must use technical, operational or regulatory manuals. This technique provides an opportunity for the students to demonstrate their ability to locate and use technical information for a purpose. The question must be unseen.

Conditions clearly stated on assessment

<table>
<thead>
<tr>
<th>Year 11</th>
<th>Year 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Recommended time: 1–1.5 hours</td>
<td>• Recommended time: 1.5–2 hours</td>
</tr>
<tr>
<td>• Perusal times may be added as required</td>
<td>• Perusal times may be added as required</td>
</tr>
<tr>
<td>• Use of support materials or technologies, e.g. notes, other reference materials, calculators or computers, may be appropriate</td>
<td>• Use of support materials or technologies, e.g. notes, other reference materials, calculators or computers, may be appropriate</td>
</tr>
<tr>
<td>• Questions may be seen or unseen</td>
<td>• Questions may be seen or unseen</td>
</tr>
<tr>
<td>• Word lengths:</td>
<td>• Word lengths:</td>
</tr>
<tr>
<td>- short responses: 50–250 words (diagrams and workings not included in word count)</td>
<td>- short responses: 50–250 words (diagrams and workings not included in word count)</td>
</tr>
<tr>
<td>- extended written response: 400–600 words</td>
<td>- extended written response: 600–800 words</td>
</tr>
<tr>
<td>• If students use computers to respond to these assessments, schools must ensure that the purpose of this technique is maintained</td>
<td>• If students use computers to respond to these assessments, schools must ensure that the purpose of this technique is maintained</td>
</tr>
</tbody>
</table>

Advice for teachers
• Format the assessment to allow for ease of reading and responding.
• Consider the language needs of the students and avoid ambiguity.
• Ensure the questions allow the full range of standards to be demonstrated.
• Consider the instrument conditions in relation to the requirements of the question/stimulus.
• Outline any permitted material in the instrument conditions, e.g. one page of handwritten notes.
• Determine appropriate use of stimulus materials and student notes. Ensure stimulus materials are succinct enough to allow students to engage with them in the time provided; if they are lengthy, consider providing students access to them before the assessment.
• Provide students with learning experiences that support the types of items, including opportunity to respond to unseen tasks and using appropriate communication strategies.
• Indicate on the assessment the dimensions and objectives that will be assessed and explain the instrument-specific standards.
4.5.2 Research

Purpose
This technique assesses research practices and the outcomes of the application of that research.

Description
- Research practices include locating and using information that goes beyond the data students have been given and the knowledge they currently have.
- A research assessment may be presented in a variety of modes. Research conventions (e.g. referencing) must be followed regardless of the mode of presentation.
- Most research responses will follow an inquiry approach and include:
  - the establishment of a research question
  - the generation and/or collection of primary and/or secondary data/information
  - students’ independent collection of information/data from a variety of sources
  - the sorting and analysis of data/information — examining and evaluating validity and value
  - synthesis of data/information
  - development of recommendations with justifications.
- This assessment occurs over a period of time, in class and often students’ own time.

Dimensions to be assessed
Research assessments are best used to determine student achievement in objectives from:
- Knowledge and understanding
- Interpretation and communication
- Critical thinking.

Types of items that could be included
A research response may be presented in a variety of modes including written, spoken and/or multimodal.

Written research responses
- Examples include research report, experimental investigation and project.

Report
- Students make a decision regarding the question, hypothesis or issue under investigation and support the decision with logical argument.
- A report will normally be presented with section headings. It will often include tables, graphs or diagrams and the analysis of statistical data.
- Where group tasks are undertaken, evidence of individual student achievement in each of the dimensions assessed must be provided.
- It is recommended that the report involve:
  - response to observations, data and/or research
  - problems, issues and challenges identified from case studies, industrial visits, or field trips
  - extensive investigation and responses that may be either theoretical and/or practical in nature
  - evaluation of problems, issues and challenges
- justification of recommendations and solutions
- supporting material including graphs, models, diagrams, photographs, and/or research information.

**Spoken research response**
- Examples include interviews, debates, webcasts, podcasts, seminars and digital presentations.

**Multimodal research response**
- Examples include presentations, conferences, seminars and digital presentations.
- A multimodal presentation is one that uses a combination of modes, such as visual, electronic, physical, audio and/or spoken modes. It must combine a minimum of two modes, with both significantly contributing to the presentation and assessment decisions. Possible multimodal presentations include documentaries, digital presentations e.g. webpages, computer simulations and presentations using software.
- Teachers must ensure that the full range of standards is possible when using spoken or multimodal techniques. The student’s spoken or multimodal response is the focus for assessment decisions; however, supporting documentation will be required to substantiate decisions and for monitoring, verification and exit purposes. Techniques used will require students to present to a real audience (e.g. a speech), or a virtual audience through the use of technology.

**Conditions clearly stated on assessment**

<table>
<thead>
<tr>
<th>Year 11</th>
<th>Year 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>● Written: 800–1000 words (word count includes data analysis, discussion and research outcomes/recommendations)</td>
<td>● Written: 1000–1500 words (word count includes data analysis, discussion and research outcomes/recommendations)</td>
</tr>
<tr>
<td>● Spoken: 3–4 minutes</td>
<td>● Spoken: 4–5 minutes</td>
</tr>
<tr>
<td>● Multimodal: 3–5 minutes</td>
<td>● Multimodal: 5–7 minutes</td>
</tr>
</tbody>
</table>

**Advice for teachers**
- Establish a focus for the research, or work with the student to develop a focus.
- Allow class time for the student to effectively undertake each component of the research assessment. Independent student time will be required to complete the task.
- Implement strategies to promote the authenticity of student work. Some strategies include annotated notes such as journals or experimental logs, drafting, teacher observation sheets, research checklists, referencing, and reference lists.
- Consult, negotiate, monitor and provide feedback before and during the research assessment. Give ethical or drafting guidance. Advice on drafting is available from the subject page on the QSA website <www.qsa.qld.edu.au/5678.html>. Feedback and assistance is provided judiciously, being gradually reduced with the development of student experience and confidence.
- Scaffolding must be provided. When a research assessment technique is undertaken for the first time, the scaffolding should help students complete the assessment by modelling the process and skills required. The scaffolding should not specify or lead the student through a series of steps dictating a solution. Scaffolding should be reduced from Year 11 to Year 12 to allow the student to better demonstrate independence in the research process. When a research assessment technique is revisited (most likely in Year 12), the scaffolding should be reduced, e.g. as a series of generic questions.
• Provide students with learning experiences in the use of appropriate communication strategies, including the generic requirements for presenting research (e.g. research report structures, referencing conventions).

• Indicate on the assessment the dimensions and objectives that will be assessed, and explain the instrument-specific standards.

4.5.3 Extended response

Purpose
This technique assesses the sustained application of higher-order cognition (analysis, synthesis and evaluation) to known and provided materials, stimuli and concepts.

Description
• The extended response to a situation requires analysis, synthesis and evaluation of data and information. The response may involve:
  - solving a problem
  - expressing and justifying a point of view
  - explaining and evaluating an issue
  - applying concepts or theories to a situation.
• Research is not the focus of this technique.
• This assessment may occur over a period of time, in class, and possibly in students’ own time.

Dimensions to be assessed
Extended response assessments are best used to determine student achievement in objectives from:
• Knowledge and understanding
• Interpretation and communication
• Critical thinking.

Types of items that could be included
An extended response may be presented in a variety of modes, including written, spoken and/or multimodal.

Written extended response
• Examples include an essay, magazine article, report, argumentative essay or informative text.
• The response may be supported by references or, where appropriate, tables of data, diagrams and flow charts.

Spoken extended response
• Examples include interviews, debates, webcasts, podcasts, seminars and digital presentations.

Multimodal extended response
• Examples include presentations, conferences, documentaries and digital presentations, e.g. webpages, computer simulations and presentations using software.
• A multimodal presentation is one that uses a combination of modes, such as visual, electronic, physical, audio and/or spoken modes. It must combine a minimum of two modes, with both significantly contributing to the presentation and assessment decisions.
• Teachers must ensure that the full range of standards are possible when using spoken or multimodal techniques. The student’s spoken or multimodal response is the focus for assessment decisions; however, supporting documentation will be required to substantiate decisions and for monitoring, verification and exit purposes. Techniques used will require students to present to a real audience (e.g. a speech), or a virtual audience through the use of technology.

**Conditions clearly stated on assessment**

<table>
<thead>
<tr>
<th>Year 11</th>
<th>Year 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written: 600–1000 words</td>
<td>Written: 800–1200 words</td>
</tr>
<tr>
<td>Spoken: 3–4 minutes</td>
<td>Spoken: 4–5 minutes</td>
</tr>
<tr>
<td>Multimodal: 3–5 minutes</td>
<td>Multimodal: 5–7 minutes</td>
</tr>
</tbody>
</table>

**Advice for teachers**

• Management of the extended response should be mostly the responsibility of the student. Supervision by the teacher may be necessary at times.

• Implement strategies to promote the authenticity of student work e.g. teachers seeing plans and or drafts, collection of student work during writing process, teacher checklists.

• Scaffolding must be provided. When an extended response assessment technique is undertaken for the first time, the scaffolding should help students complete the assessment by modelling the process and skills required. The scaffolding should not specify or lead the student through a series of steps dictating a solution. Scaffolding should be reduced from Year 11 to Year 12 to allow the student to better demonstrate independence. When an extended response is revisited (most likely in Year 12), the scaffolding should be reduced, e.g. as a series of generic questions.

• Provide learning experiences that support the mode and genre of the instrument, modelling the assessment technique where possible.

• Indicate on the assessment the dimensions and objectives that will be assessed, and explain the instrument-specific standards.

**4.6 Requirements for verification folio**

A verification folio is a collection of a student’s responses to assessment instruments on which the level of achievement is based. For students who are to exit with four semesters of credit, each folio should contain the range of assessments for making summative judgments as stated below.

Students’ verification folios for Aerospace Studies must contain:

• a minimum of 4 and a maximum of 6 assessment instruments

• evidence of at least two dimensions being assessed per assessment instrument

• at least one supervised written (including unseen questions), which assesses all three (3) dimensions

• at least one research in a written report format which assesses all three (3) dimensions

• a student profile completed to date.

For information about preparing monitoring and verification submissions, schools should refer to the *The A–Z of Senior Moderation*, available at <www.qsa.qld.edu.au/1426.html>. 

4.6.1 Post-verification assessment
In addition to the contents of the verification folio, there must be at least one subsequent summative assessment in the exit folio. It should reflect the stage of the course from which it comes. For this syllabus, students are to complete one significant instrument which assesses all three (3) dimensions.

4.7 Exit standards
The purpose of standards is to make judgments about students’ levels of achievement at exit from a course of study. The standards are described in the same dimensions as the objectives of the syllabus. The standards describe how well students have achieved the objectives and are stated in the standards matrix.

The following dimensions must be used:
- Dimension 1: Knowledge and understanding
- Dimension 2: Interpretation and communication
- Dimension 3: Critical thinking.

Each dimension must be assessed in each semester, and each dimension is to make an equal contribution to the determination of exit levels of achievement.
4.8 Determining exit levels of achievement

When students exit the course of study, the school is required to award each student an exit level of achievement from one of the five levels:

- Very High Achievement (VHA)
- High Achievement (HA)
- Sound Achievement (SA)
- Limited Achievement (LA)
- Very Limited Achievement (VLA).

Exit levels of achievement are summative judgments made when students exit the course of study. For most students this will be after four semesters. For these students, judgments are based on exit folios providing evidence of achievement in relation to all objectives of the syllabus and standards.

All the principles of exit assessment must be applied when making decisions about exit levels of achievement.

4.8.1 Determining a standard

The standard awarded is an on-balance judgment about how the qualities of the student’s work match the standards descriptors overall in each dimension. This means that it is not necessary for the student to have met every descriptor for a particular standard in each dimension.

When standards have been determined in each of the dimensions for this subject, the following table is used to award exit levels of achievement, where A represents the highest standard and E the lowest. The table indicates the minimum combination of standards across the dimensions for each level.

<table>
<thead>
<tr>
<th>Exit Level</th>
<th>Standard Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>VHA</td>
<td>Standard A in any two dimensions and no less than a B in the remaining dimension</td>
</tr>
<tr>
<td>HA</td>
<td>Standard B in any two dimensions and no less than a C in the remaining dimension</td>
</tr>
<tr>
<td>SA</td>
<td>Standard C in any two dimensions and no less than a D in the remaining dimension</td>
</tr>
<tr>
<td>LA</td>
<td>At least Standard D in any two dimensions</td>
</tr>
<tr>
<td>VLA</td>
<td>Standard E in the three dimensions</td>
</tr>
</tbody>
</table>

Some students will exit after one, two or three semesters. For these students, judgments are based on folios providing evidence of achievement in relation to the objectives of the syllabus covered to that point in time. The particular standards descriptors related to those objectives are used to make the judgment.

Further information can be found at <www.qsa.qld.edu.au/1426.html>. 
### 4.8.2 Standards matrix

<table>
<thead>
<tr>
<th>Knowledge and understanding</th>
<th>Standard A</th>
<th>Standard B</th>
<th>Standard C</th>
<th>Standard D</th>
<th>Standard E</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td></td>
</tr>
<tr>
<td>- identification and description of comprehensive range of significant technical terms and principles</td>
<td>- identification and description of a wide range of relevant technical terms and principles</td>
<td>- identification and description of a range of technical terms and principles</td>
<td>- identification of a narrow range of terms and principles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- accurate recall and effective use of relevant rules, regulations, procedures and mathematical processes</td>
<td>- accurate recall and use of rules, regulations, procedures and mathematical processes</td>
<td>- recall and use of rules, regulations, procedures and mathematical processes</td>
<td>- recall and use of some rules, procedures and mathematical processes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- thorough explanation of technical concepts, principles, processes, procedures, rules and regulations.</td>
<td>- detailed explanation of technical concepts, principles, processes, procedures, rules and regulations.</td>
<td>- explanation of technical concepts, principles, processes, procedures, rules and regulations.</td>
<td>- explanation of familiar concepts, principles, processes, procedures, rules and regulations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interpretation and communication</th>
<th>Standard A</th>
<th>Standard B</th>
<th>Standard C</th>
<th>Standard D</th>
<th>Standard E</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td></td>
</tr>
<tr>
<td>- discerning selection and organisation of relevant information and/or data</td>
<td>- effective selection and organisation of relevant information and/or data</td>
<td>- selection and organisation of information and/or data</td>
<td>- selection of some information and/or data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- accurate and detailed interpretation and application of concepts, principles, processes, procedures, rules and regulations</td>
<td>- accurate interpretation and application of concepts, principles, processes, procedures, rules and regulations</td>
<td>- Interpretation and application of concepts, principles, processes, procedures, rules and regulations</td>
<td>- simple interpretation and application of basic concepts, principles, processes, procedures, rules and regulations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- sustained use and control of communication with insightful use of appropriate mode, genre and language conventions to convey meaning.</td>
<td>- effective use and control of communication using mode, genre and language conventions to convey meaning.</td>
<td>- suitable communication using mode, genre and language conventions to convey meaning.</td>
<td>- simple communication using aspects of appropriate genre and language conventions.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interpretation and communication</th>
<th>Standard A</th>
<th>Standard B</th>
<th>Standard C</th>
<th>Standard D</th>
<th>Standard E</th>
</tr>
</thead>
<tbody>
<tr>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td></td>
</tr>
<tr>
<td>- statement of some simple terms and principles</td>
<td>- accurate recall and use of rules, regulations, procedures and mathematical processes</td>
<td>- recall and use of some rules, procedures and mathematical processes</td>
<td>- recall of some rules and procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- statement of simple concepts, principles, processes, rules and regulations.</td>
<td>- detailed explanation of technical concepts, principles, processes, procedures, rules and regulations.</td>
<td>- explanation of familiar concepts, principles, processes, procedures, rules and regulations.</td>
<td>- statement of simple concepts, principles, processes, rules and regulations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Standard A</th>
<th>Standard B</th>
<th>Standard C</th>
<th>Standard D</th>
<th>Standard E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Critical thinking</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
<td>The student work has the following characteristics:</td>
</tr>
<tr>
<td>• thorough analysis of detailed and relevant information and/or data from technical, operational, regulatory and historical sources to develop arguments</td>
<td>• effective analysis of relevant information and/or data from technical, operational, regulatory and historical sources to develop arguments</td>
<td>• analysis of information and/or data from technical, operational, regulatory and historical sources to develop arguments</td>
<td>• simple analysis of information and data from sources</td>
<td>• superficial analysis of simple information and data</td>
</tr>
<tr>
<td>• critical evaluation of problems, issues and challenges to devise insightful recommendations and/or solutions</td>
<td>• detailed evaluation of problems, issues and challenges to devise appropriate recommendations and/or solutions</td>
<td>• evaluation of problems, issues and challenges to devise recommendations and/or solutions</td>
<td>• simple evaluation of problems, issues and challenges to devise obvious recommendations and/or solutions</td>
<td>• statement of opinion only, with little or no evaluation</td>
</tr>
<tr>
<td>• comprehensive justification of recommendations and/or solutions.</td>
<td>• logical justification of recommendations and/or solutions.</td>
<td>• brief justification of recommendations and/or solutions.</td>
<td>• simple justification of recommendations and/or solutions.</td>
<td>• little or no justification of recommendations and/or solutions.</td>
</tr>
</tbody>
</table>
### 5 Glossary

<table>
<thead>
<tr>
<th>Abbreviation/ Term</th>
<th>Expansion</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>aerodynamics</td>
<td>Study of the motion of air, particularly when interacting with a moving object</td>
<td></td>
</tr>
<tr>
<td>aeronautics</td>
<td>Art or science of flight</td>
<td></td>
</tr>
<tr>
<td>aerospace</td>
<td>Refers to the technology and industry involving research, design, manufacture and operation of vehicles that move through air and space</td>
<td></td>
</tr>
<tr>
<td>AIP</td>
<td>Aeronautical Information Publication</td>
<td>Information intended for operational use by aviators, including airfield arrival, departure, approach information, obstacle data, maps and charts</td>
</tr>
<tr>
<td>airside</td>
<td>all areas accessible by aircraft at an airport (see landside)</td>
<td>Includes runways, taxiways and ramps</td>
</tr>
<tr>
<td>ARFOR</td>
<td>area forecast</td>
<td>Weather forecast for a given area or region</td>
</tr>
<tr>
<td>astronauts</td>
<td>Science of the construction and operation of vehicles for travel in space beyond the earth’s atmosphere</td>
<td></td>
</tr>
<tr>
<td>aviation</td>
<td>Design, development, manufacture and operation of aircraft and the science of powered flight</td>
<td></td>
</tr>
<tr>
<td>avionics</td>
<td>Electronics designed for use in aircraft and spacecraft</td>
<td></td>
</tr>
<tr>
<td>birdstrike</td>
<td>Collision between an aircraft and a bird or birds</td>
<td></td>
</tr>
<tr>
<td>CASA</td>
<td>Civil Aviation Safety Authority</td>
<td>Independent government body responsible for aviation safety, including flight crew licensing, maintenance engineer licensing and aerodrome certification</td>
</tr>
<tr>
<td>CRM</td>
<td>Crew Resource Management</td>
<td>Art or science of management of cabin or cockpit personnel while operating aircraft</td>
</tr>
<tr>
<td>drag</td>
<td>Aerodynamic force that opposes the forward motion of an aircraft</td>
<td></td>
</tr>
<tr>
<td>electrics</td>
<td>System that generates, regulates and distributes electrical power throughout an aircraft</td>
<td></td>
</tr>
<tr>
<td>FOD</td>
<td>Foreign Object Damage</td>
<td></td>
</tr>
<tr>
<td>hydraulics</td>
<td>System using fluid under pressure to transmit force, and commonly used to power flight controls and landing gear actuators</td>
<td></td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organisation</td>
<td>International regulatory body responsible for standards in air navigation and air safety</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and communication technology</td>
<td></td>
</tr>
<tr>
<td>IFR</td>
<td>instrument flight rules</td>
<td>Rules governing flight of aircraft in Instrument Meteorological Conditions (IMC)</td>
</tr>
<tr>
<td>Abbreviation/Term</td>
<td>Expansion</td>
<td>Comments</td>
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<tr>
<td>landside</td>
<td>areas not accessible by aircraft at an airport (see airside)</td>
<td>Includes car parks, terminal buildings (not if there is access to airside) and access roads</td>
</tr>
<tr>
<td>lift</td>
<td></td>
<td>Aerodynamic force that acts along the normal axis of an aircraft</td>
</tr>
<tr>
<td>Manual</td>
<td>technical, regulatory and operational</td>
<td>Includes examples: CASA regulatory documents, aircraft maintenance documentation, standard operating procedures</td>
</tr>
<tr>
<td>METAR</td>
<td>METeorological Report — Aerodrome, Routine</td>
<td>Routine airfield weather report issued at hourly or half-hourly intervals</td>
</tr>
<tr>
<td>P</td>
<td>Preparatory Year</td>
<td></td>
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<tr>
<td>pneumatics</td>
<td></td>
<td>System using gas under pressure to transmit force, and commonly used to power gyroscopic instrument air systems and de-icing boots</td>
</tr>
<tr>
<td>ramp</td>
<td></td>
<td>Where aircraft are parked, including for loading and refuelling (sometimes called “apron”)</td>
</tr>
<tr>
<td>SOP</td>
<td>Standard Operating Procedure</td>
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<tr>
<td>synoptic chart</td>
<td></td>
<td>Chart displaying weather patterns</td>
</tr>
<tr>
<td>TAF</td>
<td>Terminal Area Forecast</td>
<td></td>
</tr>
<tr>
<td>TBO</td>
<td>Time Between Overhauls</td>
<td></td>
</tr>
<tr>
<td>TEM</td>
<td>Threat and Error Management</td>
<td>Management tool devised to enhance operational safety by identifying threats in working environments and reducing operator error rates</td>
</tr>
<tr>
<td>thrust</td>
<td></td>
<td>Propulsive force produced by aircraft power plants</td>
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<tr>
<td>weight</td>
<td></td>
<td>Force acting along the normal axis of an aircraft that opposes lift</td>
</tr>
</tbody>
</table>
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