



AVAT12006 Commercial Pilot Licence Aerodynamics & Aircraft General Knowledge Term 1 - 2023

Profile information current as at 06/05/2024 12:20 am

All details in this unit profile for AVAT12006 have been officially approved by CQUniversity and represent a learning partnership between the University and you (our student). The information will not be changed unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

Overview

This unit will provide you with the knowledge of aerodynamics relevant for low altitude, sub-sonic flight in piston engine aircraft and the knowledge of small commercial aircraft power plants and systems. You will cover the aeronautical knowledge requirements of the Civil Aviation Safety Authority Commercial Pilot Licence aerodynamics as well as the General Aeronautical Knowledge syllabus. You will study the aerodynamic properties of an aerofoil and how it produces lift and drag. You will also study the forces and moments acting on an aeroplane in flight and how these affect an aeroplane's stability and controllability. Normal and abnormal flight characteristics and performance will also be studied. Topics you will study in depth include piston engine power plants and propellers. You will learn about aircraft electrical and hydraulic systems, fuel systems, and ice and rain protection systems. You will also become familiar with flight and navigation instruments.

Details

Career Level: *Undergraduate*

Unit Level: *Level 2*

Credit Points: 6

Student Contribution Band: 8

Fraction of Full-Time Student Load: 0.125

Pre-requisites or Co-requisites

Students must meet all requisites: 1. AVAT11002 Basic Aeronautical Knowledge OR (AVAT11012 Aviation Practice AND AVAT11013 Introduction to Aviation); AND 2. AVAT11005 Flight Fundamentals; AND 3. AVAT11010 Aviation Safety Fundamentals OR AVAT11007 Flight Planning, Performance, and Operation.

Important note: Students enrolled in a subsequent unit who failed their pre-requisite unit, should drop the subsequent unit before the census date or within 10 working days of Fail grade notification. Students who do not drop the unit in this timeframe cannot later drop the unit without academic and financial liability. See details in the [Assessment Policy and Procedure \(Higher Education Coursework\)](#).

Offerings For Term 1 - 2023

- Brisbane
- Bundaberg
- Cairns
- Online
- Perth

Attendance Requirements

All on-campus students are expected to attend scheduled classes – in some units, these classes are identified as a mandatory (pass/fail) component and attendance is compulsory. International students, on a student visa, must maintain a full time study load and meet both attendance and academic progress requirements in each study period (satisfactory attendance for International students is defined as maintaining at least an 80% attendance record).

Website

[This unit has a website, within the Moodle system, which is available two weeks before the start of term. It is important that you visit your Moodle site throughout the term. Please visit Moodle for more information.](#)

Class and Assessment Overview

Recommended Student Time Commitment

Each 6-credit Undergraduate unit at CQUniversity requires an overall time commitment of an average of 12.5 hours of study per week, making a total of 150 hours for the unit.

Class Timetable

[Regional Campuses](#)

Bundaberg, Cairns, Emerald, Gladstone, Mackay, Rockhampton, Townsville

[Metropolitan Campuses](#)

Adelaide, Brisbane, Melbourne, Perth, Sydney

Assessment Overview

1. **Written Assessment**

Weighting: 20%

2. **Online Quiz(zes)**

Weighting: 20%

3. **Examination**

Weighting: 60%

Assessment Grading

This is a graded unit: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the unit of at least 50%, or an overall grade of 'pass' in order to pass the unit. If any 'pass/fail' tasks are shown in the table above they must also be completed successfully ('pass' grade). You must also meet any minimum mark requirements specified for a particular assessment task, as detailed in the 'assessment task' section (note that in some instances, the minimum mark for a task may be greater than 50%). Consult the [University's Grades and Results Policy](#) for more details of interim results and final grades.

CQUniversity Policies

All University policies are available on the [CQUniversity Policy site](#).

You may wish to view these policies:

- Grades and Results Policy
- Assessment Policy and Procedure (Higher Education Coursework)
- Review of Grade Procedure
- Student Academic Integrity Policy and Procedure
- Monitoring Academic Progress (MAP) Policy and Procedure – Domestic Students
- Monitoring Academic Progress (MAP) Policy and Procedure – International Students
- Student Refund and Credit Balance Policy and Procedure
- Student Feedback – Compliments and Complaints Policy and Procedure
- Information and Communications Technology Acceptable Use Policy and Procedure

This list is not an exhaustive list of all University policies. The full list of University policies are available on the [CQUniversity Policy site](#).

Previous Student Feedback

Feedback, Recommendations and Responses

Every unit is reviewed for enhancement each year. At the most recent review, the following staff and student feedback items were identified and recommendations were made.

Feedback from Lecture and email

Feedback

Require more worked examples

Recommendation

Add more worked examples and discuss them in tutorials.

Unit Learning Outcomes

On successful completion of this unit, you will be able to:
























1. Explain the aerodynamic properties of an aerofoil
2. Apply the Coanda effect and Bernoulli's theorem to demonstrate and calculate how an aerofoil produces lift and drag
3. Examine the forces and moments acting on an aircraft in all stages of flight
4. Discuss the factors that affect the stability and control of an aircraft in flight
5. Determine the performance aspects of power, weight, and speed in flight maneuvers
6. Explain the factors that affect the stall and spin characteristics of an aeroplane.

N/A. No external accreditation.

Alignment of Learning Outcomes, Assessment and Graduate Attributes

 N/A Level	 Introductory Level	 Intermediate Level	 Graduate Level	 Professional Level	 Advanced Level
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Alignment of Assessment Tasks to Learning Outcomes

Assessment Tasks	Learning Outcomes					
	1		2		3	4 5 6
1 - Communication						
2 - Problem Solving						
3 - Critical Thinking						
4 - Information Literacy						
5 - Team Work						
6 - Information Technology Competence						
7 - Cross Cultural Competence						
8 - Ethical practice						
9 - Social Innovation						
10 - Aboriginal and Torres Strait Islander Cultures						

Textbooks and Resources

Textbooks

AVAT12006

Prescribed

Aerodynamics for Private and Commercial Pilots Licences

Edition: first (2015)

Authors: David Robson

Aviation Theory Centre

Australia

ISBN: 978-1-8755-37-83-9

Binding: Paperback

AVAT12006

Supplementary

Flight Physics

(2002)

Authors: E Torenbeek and H. Wittenberg

Springer

London , United Kingdom

ISBN: 978-1-4020-8663-2 and e-978-1-4020-8664-9

Binding: Hardcover

Additional Textbook Information

This supplementary textbook is available in the library as an e-book.

[View textbooks at the CQUniversity Bookshop](#)

IT Resources

You will need access to the following IT resources:

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)

Referencing Style

All submissions for this unit must use the referencing styles below:

- [Australian Guide to Legal Citation, 4th ed](#)
- [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

Teaching Contacts

Aruna Ranganathan Unit Coordinator

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Will Njagi Unit Coordinator

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Schedule

Week 1 - 06 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic

Introduction. Structure of the atmosphere. Terminology used in aviation aerodynamics.

Aerodynamics: Chapter 1

Week 2 - 13 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Newton's Laws, Bernoulli's Principal. Coanda force. Definitions of airspeed	Aerodynamics: Chapter 1	None

Week 3 - 20 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Aerodynamic Lift and four principal forces acting on an aircraft. Centre of pressure and pressure distribution around and aerofoil.	Aerodynamics: Chapter 1	Quiz 1 opened

Week 4 - 27 Mar 2023

Module/Topic	Chapter	Events and Submissions/Topic
Drag. Different components of Drag, definitions and application to aircraft. Numerical calculations.	Aerodynamics: Chapter 1	None

Week 5 - 03 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
Basic flight controls. Aerodynamic balancing. Flight stability and the basic action of the four main forces on flight, such as pitching.	Aerodynamics: Chapter 3 and 5	Quiz 1 closes Quiz 2 opened

Vacation Week - 10 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
No lectures	Review material from first 5 weeks.	None

Week 6 - 17 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
Aerodynamics and flight controls of aircraft manoeuvres. Climbing, descending, turning and the advent of stalling.	Aerodynamics: Chapter 5,6 and 8	Quiz 2 closes Quiz 3 opened Written Assignment Due: Week 6 Monday (17 Apr 2023) 11:45 pm AEST

Week 7 - 24 Apr 2023

Module/Topic	Chapter	Events and Submissions/Topic
Aerodynamic and control aspects of flight events. The spin, spiral dive, landing and takeoff.	Aerodynamics: Chapters 7 and 8	None

Week 8 - 01 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
The technical and practical aspects of aircraft stability and control. Pitching, rolling and yawing.	Aerodynamics: Chapter 4	Quiz 3 closes Quiz 4 opens

Week 9 - 08 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Aerodynamic and practical aspects of aircraft stability, measures to alleviate inherent and common problems. Modified control surface design.	Aerodynamics: Chapter 4	None

Week 10 - 15 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
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Wake turbulence. Phenomenon, aerodynamics, extent and avoidance.

Aerodynamics: Chapter 7

Quiz 4 closes
Quiz 5 opens

Week 11 - 22 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
The application and applicability of aerodynamics to flight. From theory to keeping aircraft in the sky.	Chapters 1,3 and 8	None

Week 12 - 29 May 2023

Module/Topic	Chapter	Events and Submissions/Topic
Review of the material covered in the unit. Highlight of salient points.	Aerodynamics: Chapter 1, and 3 to 8	Quiz 5 closes

Review/Exam Week - 05 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic
Review of past exams and guidance on preparation for final exam	Past exam papers.	None

Exam Week - 12 Jun 2023

Module/Topic	Chapter	Events and Submissions/Topic
Final Exam	All chapters covered in the Aerodynamics text plus tutorials and assignment review.	Exam

Term Specific Information

Will Njagi is the Lecturer for this unit and can be contacted at w.njagi@cqu.edu.au.

Aruna Ranganathan is the Unit Coordinator and can be contacted at a.ranganathan@cqu.edu.au and +61 2 9324 5748.

Assessment Tasks

1 Written Assignment

Assessment Type

Written Assessment

Task Description

Select an aircraft accident pertaining to any aircraft . This may be anything from a light aircraft to a commercial airliner.

Ensure that the accident involves an element relating to aerodynamics. For example, loss of control due to stall or spin. As another example, the primary cause of an accident may be due to lack of training or pilot fatigue, which gave rise to a loss of situational awareness after which the aircraft entered a deep stall and crashed. Another cause may be lack of training on a new variant of an aircraft.

Critically analyse the accident. Include in your paper:

- Accident description (what, when, why, etc);
- The aerodynamics and systems factors contributing to this accident;
- The actions or lack of actions by the pilot.

The safety analysis and recommendations.

If there is limited information available about the accident, you may express your own opinion but ensure you justify your reasoning.

Assessment Due Date

Week 6 Monday (17 Apr 2023) 11:45 pm AEST
midnight

Return Date to Students

Week 8 Monday (1 May 2023)

via Moodle

Weighting

20%

Assessment Criteria

The paper should be written in a report format with a title page, executive summary, introduction, main body, conclusion / recommendations.

Referencing required is Harvard style.

Number the pages and include a table of contents.

You may add section and sub section numbers and headings.

Use maps and diagrams if appropriate.

Use Arial or Calibri (Body) 11 or 12 font. Remember that presentation is very important

Assessment will be based on evidence of a thorough search of the available literature, the general presentation of the report, clarity of English, spelling, punctuation and correct arrangement of sentences and paragraphs (i.e. well written English). The development of the narration, explanation and the resulting conclusions.

Referencing Style

- [Australian Guide to Legal Citation, 4th ed](#)
- [Harvard \(author-date\)](#)

Submission

Online

Submission Instructions

Submit through Moodle

Learning Outcomes Assessed

- Explain the aerodynamic properties of an aerofoil
- Apply the Coanda effect and Bernoulli's theorem to demonstrate and calculate how an aerofoil produces lift and drag
- Examine the forces and moments acting on an aircraft in all stages of flight
- Discuss the factors that affect the stability and control of an aircraft in flight
- Determine the performance aspects of power, weight, and speed in flight maneuvers
- Explain the factors that affect the stall and spin characteristics of an aeroplane.

2 There will be 5 online quizzes throughout the term contributing 20% to final assessment. They will be tackled online and be due at approximately 2 week intervals as given in the Moodle site

Assessment Type

Online Quiz(zes)

Task Description

Each quiz consists of 10 questions with 4 possible answers. You must select what you think is the correct solution. These are short questions and answers, for example, Qn . What gives an aircraft the basic Lift it needs to fly?

Four Possible Answers are: (1) the shape of the tailplane; (2) the imbalance of pressure on the upper and lower surfaces of the wings; (3) the inclination of the chord line to the horizontal; (4) the upward angle of the aircraft nose to the vertical.

Number of Quizzes

5

Frequency of Quizzes

Fortnightly

Assessment Due Date

Due dates for each quiz are detailed on Moodle and will be reaffirmed in the Lectures

Return Date to Students

As specified after the closing date for each quiz.

Weighting

20%

Assessment Criteria

This a simple correct or incorrect answer.

Referencing Style

- [Australian Guide to Legal Citation, 4th ed](#)
- [Harvard \(author-date\)](#)

Submission

Online

Learning Outcomes Assessed

- Apply the Coanda effect and Bernoulli's theorem to demonstrate and calculate how an aerofoil produces lift and drag
- Explain the factors that affect the stall and spin characteristics of an aeroplane.

Examination

Outline

Complete an invigilated examination.

Date

During the examination period at a CQUniversity examination centre.

Weighting

60%

Length

120 minutes

Minimum mark or grade

50

Exam Conditions

Restricted.

Materials

Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments).

Calculator - non-programmable, no text retrieval, silent only

Academic Integrity Statement

As a CQUniversity student you are expected to act honestly in all aspects of your academic work.

Any assessable work undertaken or submitted for review or assessment must be your own work. Assessable work is any type of work you do to meet the assessment requirements in the unit, including draft work submitted for review and feedback and final work to be assessed.

When you use the ideas, words or data of others in your assessment, you must thoroughly and clearly acknowledge the source of this information by using the correct referencing style for your unit. Using others' work without proper acknowledgement may be considered a form of intellectual dishonesty.

Participating honestly, respectfully, responsibly, and fairly in your university study ensures the CQUniversity qualification you earn will be valued as a true indication of your individual academic achievement and will continue to receive the respect and recognition it deserves.

As a student, you are responsible for reading and following CQUniversity's policies, including the [Student Academic Integrity Policy and Procedure](#). This policy sets out CQUniversity's expectations of you to act with integrity, examples of academic integrity breaches to avoid, the processes used to address alleged breaches of academic integrity, and potential penalties.

What is a breach of academic integrity?

A breach of academic integrity includes but is not limited to plagiarism, self-plagiarism, collusion, cheating, contract cheating, and academic misconduct. The Student Academic Integrity Policy and Procedure defines what these terms mean and gives examples.

Why is academic integrity important?

A breach of academic integrity may result in one or more penalties, including suspension or even expulsion from the University. It can also have negative implications for student visas and future enrolment at CQUniversity or elsewhere. Students who engage in contract cheating also risk being blackmailed by contract cheating services.

Where can I get assistance?

For academic advice and guidance, the [Academic Learning Centre \(ALC\)](#) can support you in becoming confident in completing assessments with integrity and of high standard.

What can you do to act with integrity?



Be Honest

If your assessment task is done by someone else, it would be dishonest of you to claim it as your own



Seek Help

If you are not sure about how to cite or reference in essays, reports etc, then seek help from your lecturer, the library or the Academic Learning Centre (ALC)



Produce Original Work

Originality comes from your ability to read widely, think critically, and apply your gained knowledge to address a question or problem