



# **AVAT12006 Aerodynamics (Commercial Pilot Licence)**

## **Term 1 - 2020**

Profile information current as at 27/04/2024 03:30 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.

### Corrections

#### **Unit Profile Correction added on 06-05-20**

The final examination will be replaced by a similar online test.

More details will be available on Moodle. The learning outcomes assessed are unchanged.

## General Information

### Overview

Aerodynamics (Commercial Pilot Licence) will provide you with the knowledge of aerodynamics relevant for low altitude, sub-sonic flight in piston engine aircraft. You will cover the aeronautical knowledge requirements of the Civil Aviation Safety Authority Commercial Pilot Licence aerodynamics 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.

### 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

Prerequisites: AVAT11002 Basic Aeronautical Knowledge; AVAT11003 Basic Aeronautical Practice and AVAT11005 Aviation Physics

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 - 2020

- Bundaberg
- Cairns
- Online

### 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 Instructor observation.

**Feedback**

More emphasis on revision time, unit review and exam preparation.

**Recommendation**

A full tutorial was conducted during week 13. Many students appeared not to attend or view the tutorial. The lecturer will place more emphasis on the importance of this final tutorial.

#### Feedback from Unit Coordinator.

**Feedback**

The unit included 6 voluntary quizzes. Many students did not attempt the quizzes. The quizzes were designed to review and consolidate subject areas and act as exam preparation.

**Recommendation**

The quizzes should be made compulsory.

#### Feedback from Student feedback/instructor observation.

**Feedback**

Some students said they felt the unit content was too detailed, whilst others stated that they had already covered some of the material in previous units.

**Recommendation**

The unit was designed to review and consolidate material presented in previous units, and also extended and build upon previous learning. The lecturer should emphasis this during the first lecturer. The unit coordinator believes that a 'happy medium' between the review and presenting new material was achieved, whilst ensuring that all the learning objectives were met.

#### Feedback from Unit Coordinator.

**Feedback**

The unit was 'inherited' and there were some areas where the presentation material contained only sufficient detail. Also, there were many formatting inconsistencies.

**Recommendation**

The unit was enhanced and tidied up in a very short period of time to ensure that all learning objectives were clearly met. Although student feedback was very positive, the unit coordinator will continue to enhance the material in certain areas to 'add value' and improve appearance.

#### Feedback from Unit Coordinator.

**Feedback**

Enhanced learning through virtual reality.

**Recommendation**

The unit coordinator is currently researching/developing flight simulator and flight deck virtual reality. Initial student feedback (and staff feedback) of the virtual reality is very positive. It is believed that virtual reality will greatly enhance the student learning experience and will be included as much as possible when this unit is taught again.

## 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 stability and control of an aircraft in flight
5. Determine the performance aspects of power, weight and speed in flight manoeuvres
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



### 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						

### Alignment of Assessment Tasks to Graduate Attributes

Assessment Tasks	Graduate Attributes									
	1	2	3	4	5	6	7	8	9	10
1 - Written Assessment - 20%	•	•	•	•						
2 - Online Quiz(zes) - 20%	•	•	•							
3 - Examination - 60%	•	•	•							

## Textbooks and Resources

### Textbooks

AVAT12006

#### Supplementary

#### **Aerodynamics for the Private and Commercial Pilot Licences**

Aviation Theory Centre

Brisbane , Queensland , Australia

ISBN: 978-1-875537-83-9

Binding: Paperback

#### **Additional Textbook Information**

Copies can be purchased at the CQUni Bookshop here: <http://bookshop.cqu.edu.au>

[View textbooks at the CQUniversity Bookshop](#)

### IT Resources

#### **You will need access to the following IT resources:**

- CQUniversity Student Email
- Internet
- Unit Website (Moodle)
- Recommended text book: Aerodynamics for the Private and Commercial Pilot Licences.

## Referencing Style

All submissions for this unit must use the referencing style: [Harvard \(author-date\)](#)

For further information, see the Assessment Tasks.

## Teaching Contacts

**Aruna Ranganathan** Unit Coordinator

[a.ranganathan@cqu.edu.au](mailto:a.ranganathan@cqu.edu.au)

## Schedule

### **Week 1 - 09 Mar 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Introduction, Atmosphere, ISA, Terminology 1.	Aerodynamics: Chapter 1.	

### **Week 2 - 16 Mar 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Terminology 2, Bernoulli, Coanda, Newton laws, Airspeed.	Aerodynamics: Chapter 1.	

### **Week 3 - 23 Mar 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Lift - 4 forces, CP, pressure distribution around aerofoils, aoa.	Aerodynamics: Chapter 1.	

### **Week 4 - 30 Mar 2020**

Module/Topic	Chapter	Events and Submissions/Topic
Drag.	Aerodynamics: Chapter 1.	

<b>Week 5 - 06 Apr 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Flight controls, aerodynamic balancing, straight and level, climb, pitching moments.	Aerodynamics: Chapters 3 and 5.	
<b>Vacation Week - 13 Apr 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
No lectures.		
<b>Week 6 - 20 Apr 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Descent, turns, stall.	Aerodynamics: Chapters 5, 6 and 8.	
<b>Week 7 - 27 Apr 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Spin, Spiral Dive, Taxi, Takeoff, Landing.	Aerodynamics: Chapters 7 and 8.	
<b>Week 8 - 04 May 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Stability and Control 1.	Aerodynamics: Chapter 4.	
<b>Week 9 - 11 May 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Stability and Control 2.	Aerodynamics: Chapter 4.	
<b>Week 10 - 18 May 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Wake turbulence, Aircraft Limitations.	Aerodynamics: Chapter 7.	
<b>Week 11 - 25 May 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Application of Aerodynamics.	Aerodynamics: Chapters 1 and 3 to 8.	<b>Written Assessment</b> Due: Week 11 Friday (29 May 2020) 11:45 pm AEST
<b>Week 12 - 01 Jun 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Review.	Aerodynamics: Chapters 1 and 3 to 8.	
<b>Review / Exam - 08 Jun 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Review / final exam.	Aerodynamics: Chapters 1 and 3 to 8.	<b>ONLINE QUIZZES</b> Due: Review/Exam Week Friday (12 June 2020) 11:45 pm AEST
<b>Exam Week - 15 Jun 2020</b>		
<b>Module/Topic</b>	<b>Chapter</b>	<b>Events and Submissions/Topic</b>
Final exam.	Aerodynamics: Chapters 1 and 3 to 8.	

## Assessment Tasks

### 1 Written Assessment

## Assessment Type

Written Assessment

## Task Description

### Aim of the assignment

To broaden your understanding of knowledge presented in the unit.

### Assignment Description

Select an aircraft accident pertaining to a **light aircraft** (maximum gross takeoff weight of 12,500 lb (5,670 kg) or less). 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.

Critically analyse the accident. Include in your paper:

- Accident description (what, when, why, etc);
- The aerodynamics and systems factors contributing to this accident;
- 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.

Since there is an element of Team Work in this assignment, you may work within a team to discuss your methodology. However, each student is required to submit a unique paper, which is subject to the standard plagiarism policies.

### Resources

Use on-line aircraft accident databases to find relevant accidents. For example:

<https://www.atsb.gov.au/>

<https://aviation-safety.net/database/>

[https://www.nts.gov/\\_layouts/nts.aviation/index.aspx](https://www.nts.gov/_layouts/nts.aviation/index.aspx)

<http://www.aviation-accidents.net/>

There are many other databases.

### Format

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.

Include number the pages, word count and a table of contents.

Use Calibri (Body) 11 font.

### Assessment

Refer to the Rubric marking matrix on Moodle.

### Assessment Due Date

Week 11 Friday (29 May 2020) 11:45 pm AEST

### Return Date to Students

Exam Week Thursday (18 June 2020)

### Weighting

20%

### Assessment Criteria

Refer to the Rubric.

### Referencing Style

- [Harvard \(author-date\)](#)

### Submission

Online

### 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 stability and control of an aircraft in flight
- Determine the performance aspects of power, weight and speed in flight manoeuvres
- Explain the factors that affect the stall and spin characteristics of an aeroplane.

### Graduate Attributes

- Communication
- Problem Solving

- Critical Thinking
- Information Literacy

## 2 ONLINE QUIZZES

### Assessment Type

Online Quiz(zes)

### Task Description

Complete the online quizzes.

### Number of Quizzes

### Frequency of Quizzes

### Assessment Due Date

Review/Exam Week Friday (12 June 2020) 11:45 pm AEST

### Return Date to Students

### Weighting

20%

### Assessment Criteria

No Assessment Criteria

### Referencing Style

- [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.

### Graduate Attributes

- Communication
- Problem Solving
- Critical Thinking

## Examination

### Outline

Complete an invigilated examination.

### Date

During the examination period at a CQUniversity examination centre.

### Weighting

60%

### Length

90 minutes

### Exam Conditions

Closed Book.

### Materials

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

## 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