

AVEN1920

Introduction to Aircraft Engineering

Term 2, 2022



Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Liya Zhao	liya.zhao2@unsw.edu.au	Make appointments through email.	J17, 301B	Teams

Lecturers

Name	Email	Availability	Location	Phone
Garth Pearce	g.pearce@unsw.edu.au	Teams	J17, 208E	Teams

School Contact Information

Location

UNSW Mechanical and Manufacturing Engineering

Ainsworth building J17, Level 1

Above Coffee on Campus

Hours

9:00–5:00pm, Monday–Friday*

*Closed on public holidays, School scheduled events and University Shutdown

Web

[School of Mechanical and Manufacturing Engineering](#)

[Engineering Student Support Services](#)

[Engineering Industrial Training](#)

[UNSW Study Abroad and Exchange](#) (for inbound students)

[UNSW Future Students](#)

Phone

(+61 2) 9385 8500 – Nucleus Student Hub

(+61 2) 9385 7661 – Engineering Industrial Training

(+61 2) 9385 3179 – UNSW Study Abroad and UNSW Exchange (for inbound students)

(+61 2) 9385 4097 – School Office**

**Please note that the School Office will not know when/if your course convenor is on campus or available

Email

[Engineering Student Support Services](#) – current student enquiries

- e.g. enrolment, progression, clash requests, course issues or program-related queries

[Engineering Industrial Training](#) – Industrial training questions

[UNSW Study Abroad](#) – study abroad student enquiries (for inbound students)

[UNSW Exchange](#) – student exchange enquiries (for inbound students)

[UNSW Future Students](#) – potential student enquiries

- e.g. admissions, fees, programs, credit transfer

[School Office](#) – School general office administration enquiries

- NB: the relevant teams listed above must be contacted for all student enquiries. The School will only be able to refer students on to the relevant team if contacted

Important Links

- [Student Wellbeing](#)
- [Urgent Mental Health & Support](#)
- [Equitable Learning Services](#)
- [Faculty Transitional Arrangements for COVID-19](#)
- [Moodle](#)
- [Lab Access](#)
- [Computing Facilities](#)
- [Student Resources](#)
- [Course Outlines](#)
- [Makerspace](#)
- [UNSW Timetable](#)
- [UNSW Handbook](#)

Course Details

Units of Credit 6

Summary of the Course

This course gives an explanation of how aircraft fly and how engineering technologies relate to the vehicle. Topics include layout of the aircraft such as structure, engines, systems and avionics; materials used in construction, introduction to lift, drag and thrust and design of aerofoils. It covers concepts and nomenclature relating to flight vehicles and the significance of aircraft configurations and flight systems.

Course Learning Outcomes

1. Describe and use the core principles of engineering mechanics to solve basic problems related to aeronautical engineering
2. Describe the basic concepts related to the aerodynamic efficiency of an aircraft, and solve basic problems in aerodynamics as they relate to aircraft performance and airfoil design
3. Demonstrate an understanding of the historical processes that led to the current state of aircraft engineering and technology
4. Apply basic engineering concepts to the analysis of aircraft systems: structures, powerplants, stability and control, avionics and materials

This is not an engineering course and so the course learning outcomes are not linked to Engineers Australia Stage One Competencies.

Teaching Strategies

Please refer to the information in Moodle

Additional Course Information

Students will be able to:

- offer some views on how a wing develops lift and identify causes of drag,
- employ mathematical expressions for lift and drag and extend these equations so as to specify the power required by an aircraft in cruise,
- plot lift and drag (as well as drag components) as a function of airspeed,
- plot power required and power available against airspeed on the same graph,
- employ equations to predict the density of the air at some altitude,
- plot power required and power available against airspeed at different altitudes and use this to determine the absolute ceiling of the aircraft,
- extend this analysis to predict the maximum climb rate and the maximum climb angle and explain the difference between the two,
- extend this analysis to predict the minimum descent rate and the maximum glide angle during descent and explain the difference between the two,
- estimate the minimum length of runway required for an aircraft to safely take-off and the minimum length of runway to safely land.

Assessment

Assessment task	Weight	Due Date	Course Learning Outcomes Assessed
1. Assignment 1	15%	Friday 1 July, 11:59pm, Week 5	1, 2, 4
2. Quizzes	50%	Wednesday 10:00-10:45 am in Week 3, 4, 5, 7, 8	1, 2, 4
3. Assignment 2	15%	Friday 29 July, 11:59pm, Week 9	1, 2, 3, 4
4. Final Class Test	20%	Wednesday 3 August, 10:00 am - 12:00 pm, Week 10	1, 2, 3, 4

Assessment 1: Assignment 1

Submission notes: Submission in Moodle

Due date: Friday 1 July, 11:59pm, Week 5

The assignment covers lecture content to date in the course.

Penalty: standard UNSW Late Policy (a late penalty of 5% of your mark per calendar day. Work submitted after five days (120 hours) will not be accepted)

This is an individual assignment.

Marks will be returned within two weeks after submission.

Assessment 2: Quizzes

Assessment length: 45 min

Submission notes: Submission in Moodle

Due date: Wednesday 10:00-10:45 am in Week 3, 4, 5, 7, 8

Online 45 min quizzes in Moodle. There are in total five quizzes. It will be held on Wednesday 10:00-10:45 am (followed by workshop/lecture), in Week 3, 4, 5, 7, 8.

Each quiz is worth 10%.

It covers lecture content to date in the course.

This is an individual assessment.

Marks will be returned within two weeks after submission.

Assessment 3: Assignment 2

Submission notes: Submission in Moodle

Due date: Friday 29 July, 11:59pm, Week 9

The assignment covers lecture content to date in the course.

Penalty: standard UNSW Late Policy (a late penalty of 5% of your mark per calendar day. Work submitted after five days (120 hours) will not be accepted).

This is an individual assignment.

Marks will be returned within two weeks after submission.

Assessment 4: Final Class Test

Assessment length: 2 hours

Submission notes: Submission in Moodle

Due date: Wednesday 3 August, 10:00 am - 12:00 pm, Week 10

This is a 2 hour test in Moodle. There will be 1.5 hours for the questions and 0.5 hours to upload your solutions. Your solutions must be submitted by the official test end time.

The test covers course content in Weeks 1-10 inclusive.

This is an individual assessment.

Marks will be returned within two weeks after submission.

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
O-Week: 23 May - 27 May		
Week 1: 30 May - 3 June	Lecture	Monday 14:00 - 16:00 Online: Introduction to flight physics, lift and drag, straight and level flight; Mechanics (forces)
	Workshop	Wednesday 10:00-12:00 Online: Demonstration on example questions.
Week 2: 6 June - 10 June	Lecture	Monday 14:00 - 16:00 Online: The atmosphere and airspeeds; Mechanics (forces)
	Workshop	Wednesday: Demonstration on example questions.
Week 3: 13 June - 17 June	Lecture	Monday: NO LECTURE (Public Holiday)
	Workshop	Wednesday 10:00-12:00 Online: Demonstration on example questions. Quiz 1 in the first 45 minutes (10:00-10:45 am).
Week 4: 20 June - 24 June	Lecture	Monday 14:00 - 16:00 Online: Climbing flight; Mechanics (forces)
	Workshop	Wednesday 10:00-12:00 Online: Demonstration on example questions. Quiz 2 in the first 45 minutes (10:00-10:45 am).
Week 5: 27 June - 1 July	Lecture	Monday 14:00 - 16:00 Online: Range and endurance equations; Mechanics (forces)
	Workshop	Wednesday 10:00-12:00 Online: Demonstration on example questions. Quiz 3 in the first 45 minutes (10:00-10:45 am).
Week 6: 4 July - 8 July		FLEXIBILITY WEEK
Week 7: 11 July - 15 July	Lecture	Monday 14:00 - 16:00 Online: Weight and balance, turning flight, take-off and landing
	Workshop	Wednesday 10:00-12:00 Online: Demonstration

		on example questions. Quiz 4 in the first 45 minutes (10:00-10:45 am).
Week 8: 18 July - 22 July	Lecture	Monday 14:00 - 16:00 Online: Introduction to aerospace structures
	Workshop	Wednesday 10:00-12:00 Online: Demonstration on example questions. Quiz 5 in the first 45 minutes (10:00-10:45 am).
Week 9: 25 July - 29 July	Lecture	Monday 14:00 - 16:00 Online: Guest lecture
	Workshop	Wednesday 10:00-12:00 Online: Demonstration on example questions.
Week 10: 1 August - 5 August	Lecture	Monday 14:00 - 16:00 Online: Revision
	Workshop	Wednesday 10:00-12:00 online: Final class test.

Resources

Prescribed Resources

Required

Anderson John, 2022, Introduction To Flight 9e, McGraw Hill.

Recommended Resources

Suggested reading

J.L. Meriam & L.G. Kraige, 2003, Engineering Mechanics, Statics, 5th edition, SI version, John Wiley & Sons, Inc.

D. Gross, W. Hauger, J. Schroder, W.A. Wall and N. Rajapaske, 2013, Engineering Mechanics 1, Statics, 2nd Edition, Springer.

A.Tewari, 2016, Basic Flight Mechanics, Springer.

E. Torenbeek & Wittenberg, 2002, *Flight Physics, Essentials of Aeronautical Disciplines and Technology, with Historical Notes*, Springer.

D. F. Anderson & S. Eberhardt, 2010, Understanding flight, 2nd edition, McGraw Hill.

R.H. Barnard & D.R. Philpott, 2004, Aircraft Flight, 3rd Edition, Pearson, Prentice Hall.

A.C. Kermode, 2012, Mechanics of Flight, 12th Edition, Pearson.

N. Cumpsty & A. Heyes, 2015, *Jet Propulsion. A simple guide to the aerodynamic and thermodynamic design and performance of jet engines*, 3rd edition, Cambridge University Press.

Course Evaluation and Development

Feedback on the course is gathered periodically using various means, including the UNSW MyExperience process, informal discussion in the final class for the course, and the School's Student/Staff meetings. Your feedback is taken seriously, and continual improvements are made to the course based, in part, on such feedback.

Submission of Assessment Tasks

Assessment submission and marking criteria

Should the course have any non-electronic assessment submission, these should have a standard School cover sheet.

All submissions are expected to be neat and clearly set out. Your results are the pinnacle of all your hard work and should be treated with due respect. Presenting results clearly gives the marker the best chance of understanding your method; even if the numerical results are incorrect.

Marking guidelines for assignment submissions will be provided at the same time as assignment details to assist with meeting assessable requirements. Submissions will be marked according to the marking guidelines provided.

Late policy

Work submitted late without an approved extension by the course coordinator or delegated authority is subject to a late penalty of five percent (5%) of the maximum mark possible for that assessment item, per calendar day.

The late penalty is applied per calendar day (including weekends and public holidays) that the assessment is overdue. There is no pro-rata of the late penalty for submissions made part way through a day. This is for all assessments where a penalty applies.

Work submitted after five days (120 hours) will not be accepted and a mark of zero will be awarded for that assessment item.

For example:

- Your course has an assessment task worth a total of 100 marks.
- You submit the assessment 2 days (or part thereof) late (i.e. from 24-48 hours after the deadline).
- The submission is graded and awarded a mark of 65/100.
- A late penalty of 10 marks is deducted from your awarded mark (2 days @ 5% of 100 marks).
- Your adjusted final score is 55/100.

For some assessment items, a late penalty may not be appropriate. These are clearly indicated in the course outline, and such assessments receive a mark of zero if not completed by the specified date. Examples include:

1. Weekly online tests or laboratory work worth a small proportion of the subject mark, or
2. Online quizzes where answers are released to students on completion, or
3. Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date, or
4. Pass/Fail assessment tasks.

Examinations

You must be available for all quizzes, tests and examinations. For courses that have final examinations,

these are held during the University examination periods: February for Summer Term, May for T1, August for T2, and November/December for T3.

Please visit myUNSW for Provisional Examination timetable publish dates. For further information on exams, please see the [Exams](#) webpage.

Special Consideration

If you have experienced an illness or misadventure beyond your control that will interfere with your assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

UNSW now has a [Fit to Sit / Submit rule](#), which means that if you attempt an exam or submit a piece of assessment, you are declaring yourself fit enough to do so and cannot later apply for Special Consideration.

For details of applying for Special Consideration and conditions for the award of supplementary assessment, please see the information on UNSW's [Special Consideration page](#).

Please note that students will **not** be required to provide **any** documentary evidence to support absences from any classes missed **because of COVID-19 public health measures such as isolation**. UNSW will **not** be insisting on medical certificates from anyone deemed to be a positive case, or when they have recovered. Such certificates are difficult to obtain and put an unnecessary strain on students and medical staff.

Applications for special consideration **will** be required for assessment and participation absences – but no documentary evidence **for COVID-19 illness or isolation** will be required.

Special Consideration Outcomes

Assessments have default Special Consideration outcomes. The default outcome for the assessment will be advised when you apply for Special Consideration. Below is the list of possible outcomes:

Outcome	Explanation	Example
Time extension	Student provided more time to submit the assessment	e.g. 1 more week of time granted to submit a report
Supplementary assessment	Student provided an alternate assessment at a later date/time	e.g. a supplementary exam is scheduled during the supplementary exam period of the term
Substitute item	The mark for the missed assessment is substituted with the mark of another assessment	e.g. mark for Quiz 1 applied also applied as mark for Quiz 2, meaning if a student achieved a mark of 20/30 for Quiz 1 and was granted Special Consideration for Quiz 2, a mark of 20/30 would be applied for Quiz 2, etc
Exemption	All course marks are recalculated excluding this assessment and its weighting	e.g. The course has an assessment structure of: - Assignments 30%, - Lab report 30%, - Final Exam 40%. If the Lab report is missed and student is granted Special Consideration, then the assessment structure may be reweighted as follows: - Assignments 50% - Final Exam 50% as though the Lab report did not exist
Non-standard	Course Coordinator is contacted for the outcome when special consideration is granted as the outcome differs on a case-by-case basis	e.g. typical for group assessments where time extension supplementary assessment could be granted to the group member, time extension could be granted to the whole group, etc. Clarify with your Course Convenor for

Academic Honesty and Plagiarism

UNSW has an ongoing commitment to fostering a culture of learning informed by academic integrity. All UNSW students have a responsibility to adhere to this principle of academic integrity. Plagiarism undermines academic integrity and is not tolerated at UNSW. *Plagiarism at UNSW is defined as using the words or ideas of others and passing them off as your own.*

Plagiarism is a type of intellectual theft. It can take many forms, from deliberate cheating to accidentally copying from a source without acknowledgement. UNSW has produced a website with a wealth of resources to support students to understand and avoid plagiarism, visit: student.unsw.edu.au/plagiarism. The Learning Centre assists students with understanding academic integrity and how not to plagiarise. They also hold workshops and can help students one-on-one.

You are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting and the proper referencing of sources in preparing all assessment tasks.

If plagiarism is found in your work when you are in first year, your lecturer will offer you assistance to improve your academic skills. They may ask you to look at some online resources, attend the Learning Centre, or sometimes resubmit your work with the problem fixed. However more serious instances in first year, such as stealing another student's work or paying someone to do your work, may be investigated under the Student Misconduct Procedures.

Repeated plagiarism (even in first year), plagiarism after first year, or serious instances, may also be investigated under the Student Misconduct Procedures. The penalties under the procedures can include a reduction in marks, failing a course or for the most serious matters (like plagiarism in an honours thesis) even suspension from the university. The Student Misconduct Procedures are available here:

www.gs.unsw.edu.au/policy/documents/studentmisconductprocedures.pdf

Academic Information

Credit points

Course credit is calculated in Units-Of-Credit (UOC). The normal workload expectation for one UOC is approximately 25 hours per term. This includes class contact hours, private study, other learning activities, preparation and time spent on all assessable work.

Most coursework courses at UNSW are 6 UOC and involve an estimated 150 hours to complete, for both regular and intensive terms. Each course includes a prescribed number of hours per week (h/w) of scheduled face-to-face and/or online contact. Any additional time beyond the prescribed contact hours should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Guidelines

All students are expected to read and be familiar with UNSW guidelines and policies. In particular, students should be familiar with the following:

- [Attendance](#)
- [UNSW Email Address](#)
- [Special Consideration](#)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)

Note: This course outline sets out description of classes at the date the Course Outline is published. The nature of classes may change during the Term after the Course Outline is published. Moodle should be consulted for the up-to-date class descriptions. If there is any inconsistency in the description of activities between the University timetable and the Course Outline (as updated in Moodle), the description in the Course Outline/Moodle applies.

Image Credit

Photo by Stephen Blake March 2017, Willis Annexe (J18) Thermofluids lab

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.