



AERO4110

Aerospace Design 2

Term Two // 2021

Course Overview

Staff Contact Details

Convenors

Name	Email	Availability	Location	Phone
Dr Sonya A Brown	sonya.brown@unsw.edu.au		Ainsworth 408D	

Demonstrators

Name	Email	Availability	Location	Phone
Arthur (Jiawei) Tan	jiawei.tan@unsw.edu.au		Ainsworth 408	

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

Course Details

Credit Points 6

Summary of the Course

This course is a capstone aerospace design project. In design teams, students develop a preliminary design of an aircraft to meet a given request for proposal. The course aims to give a holistic approach to the aerospace design process. Students are required to consider the requirements of several disciplines including conceptual design, configuration, weights, sizing, payload, aerodynamics, propulsion, structures, systems, stability and control, performance, and cost. The course will give students the opportunity to integrate these elements into a single congruous design of an aircraft. Teamwork, report writing, and presentation skills are a focus to develop important professional skills for industry.

Course Aims

This course is a capstone aerospace design project. In design teams, students develop a preliminary design of an aircraft to meet a given request for proposal. The course aims to give a holistic approach to the aerospace design process. Students are required to consider the requirements of several disciplines including conceptual design, configuration, weights, sizing, payload, aerodynamics, propulsion, structures, systems, stability and control, performance, and cost. The course will give students the opportunity to integrate these elements into a single congruous design of an aircraft. Teamwork, report writing, and presentation skills are a focus to develop important professional skills for industry.

Course Learning Outcomes

After successfully completing this course, you should be able to:

Learning Outcome	EA Stage 1 Competencies
1. Produce a preliminary aircraft design to meet request for proposal and regulatory requirements.	PE1.5, PE2.1, PE2.3, PE3.3
2. Apply aerospace cross-disciplinary principles appropriately for a congruous design.	PE1.3, PE1.4, PE2.3, PE3.4
3. Cooperatively manage and contribute to an engineering team.	PE1.6, PE2.4, PE3.5, PE3.6
4. Professionally communicate design concepts and information.	PE3.2, PE3.3

Teaching Strategies

This course is a capstone aerospace design project to meet a given request for proposal. Students will address the design challenge in teams. Lectures will introduce the design project and briefly outline some of the required areas for design. Detailed technical information relevant to each team's design should be sought outside of class from appropriate engineering sources to make and justify design decisions. Studio classes will include weekly design meetings for each team, plus general time for teams to work together on their projects with teaching staff support. Teamwork is central to this course to assist in developing the communication and interpersonal skills critical for industry. The final designs will be

presented to the class and peers to improve professional communication.

Additional Course Information

Prerequisites

AERO3110 Aerospace Design 1

Assumed Knowledge

Students are expected to have a sound understanding of aerospace regulations, aerodynamics, flight performance, propulsion, structural design and analysis, materials, flight dynamics, and aerospace systems prior to attempting this course.

Platforms and Communication

Aerospace Design 2 will use a combination of Microsoft Teams and Moodle. The primary communication channel will be Microsoft Teams. Please ensure you check Teams regularly for any important announcements. Questions are best addressed in class or via Teams. We will do our best to respond to all queries in one business day.

Class Times

Please refer to your class timetable for the learning activities you are enrolled in and attend only those classes.

	Day	Time	Delivery Mode
Lectures	Flexible	Around 2 hours / week	Online Video - Provided on Microsoft Teams and Moodle (Weeks 1-5,7-9)
Team Meetings	Monday (Studio Class)	3pm - 4pm	Microsoft Teams (Weeks 1-2,4-10) with Demonstrator support. Note: For Week 3 an alternate availability time with the Demonstrator will be advised via Teams.
	Outside-of-Class	Minimum 2 hours / week	Microsoft Teams (Recommended) independently with your teams.
Presentations	Wednesday Week 10	10am - 11am	Online (Platform TBA) (Week 10)

Assessment

Weekly design meetings must be documented with minutes. Minutes should be uploaded in a timely manner to a folder located in the Files tab of the Meetings channel in your designated Microsoft Teams team.

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Progress Design Reports (2) (Team)	30%	See below	1, 2, 3, 4
Final Design Report (Team)	50%	19/08/2021 04:00 PM	1, 2, 3, 4
Presentation (Team)	20%	04/08/2021 10:00 AM	3, 4

Assessment Details

Assessment 1: Progress Design Reports (2) (Team)

Length: 30 pages maximum (per Progress Report)

Details:

Two Progress Reports regarding the aerospace design project - Teamwork.

Progress Report 1 (15%) - Due *11:50pm Monday Week 4*

Progress Report 2 (15%) - Due *11:50pm Monday Week 8*

Submission via Moodle.

Deadline for absolute fail: Three (3) days after relevant due date.

Marks returned two weeks after submission.

Additional details:

Maximum page numbers exclude front matter, references, and appendices.

Marking:

The team mark will be moderated by academic review and peer evaluation to give an individual mark for each assessment.

For each assessment, an individual statement of claim of contributions must be submitted electronically by the assessment due date. Failure to submit an individual statement of claim for any assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment.

For each assessment, a peer evaluation must be completed electronically. Peer evaluations must be completed within one week following each assessment due date. Failure to complete the peer evaluation

by the required deadline for any assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment.

Assessment 2: Final Design Report (Team)

Details:

Final Report regarding the aerospace design project - Teamwork.

Submission via Moodle.

Deadline for absolute fail: Five (5) days after relevant due date.

Marks returned with release of final results.

Additional details:

Maximum page numbers exclude front matter, references, and appendices.

Marking:

The team assessment mark will be moderated by academic review and peer evaluation to give an individual mark for the assessment.

For each assessment, an individual statement of claim of contributions must be submitted electronically by the assessment due date. Failure to submit an individual statement of claim for any assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment.

For each assessment, a peer evaluation must be completed electronically. Peer evaluations for the Final Design Report must be completed by 4:00pm Tuesday August 24th. Failure to complete the peer evaluation by the required deadline for any assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment.

Assessment 3: Presentation (Team)

Details:

Team presentation, brochure and model.

Deadline for absolute fail: N/A

Marks returned with release of final results.

Additional details:

Presentations will commence at 10am on Wednesday of Week 10. Presentation slides, and a soft copy of your brochure, must be submitted electronically via Moodle.

Each team is required to produce a scale model of their final aircraft. For 2021 Term 2, your team can decide if you manufacture and submit your model physically yourselves (by 10am on Tuesday of Week 10); or have the UNSW MakerSpace team support model manufacture (manufactured by 3D printing) and submit physically on your behalf. For UNSW MakerSpace manufacture, the appropriate CAD files

required must be submitted to the MakerSpace by 10am on Wednesday of Week 9.

Marking:

The team mark will be moderated by academic review and peer evaluation to give an individual mark for each assessment.

For each assessment, an individual statement of claim of contributions must be submitted electronically by the assessment due date. Failure to submit an individual statement of claim for any assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment.

For each assessment, a peer evaluation must be completed electronically. Peer evaluations must be completed within one week following the assessment due date. Failure to complete the peer evaluation by the required deadline for any assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment.

Attendance Requirements

Attendance is required at all online studio classes via Microsoft Teams. If your absence equates to more than 20% of studio classes, you may fail the course, or be denied special consideration.

You must be available for all assessments. Your Design Presentations will be held online on Wednesday, August 4th from 10-11am, you must be present for the entire event.

Course Schedule

[View class timetable](#)

Timetable

Date	Type	Content
Week 1: 31 May - 4 June	Lecture	A: Introduction and RFPs B: Design Process C: Conceptual Design and Configuration (Jane's All the World's Aircraft, Raymer Ch 2)
Week 2: 7 June - 11 June	Lecture	A: Existing Aircraft Comparisons & Weight Sizing (Roskam Part I Ch 2, Raymer Ch 6, §19.3)
Week 3: 14 June - 18 June	Lecture	A: T/W, W/S, Sizing (Raymer Ch 5, Ch 6, §19.4 & §19.5)
Week 4: 21 June - 25 June	Lecture	A: Aerodynamics (Raymer Ch 4, §7.8, §7.9)
Week 5: 28 June - 2 July	Lecture	A: Configuration & Payload (Raymer Ch 7, Ch 8, Ch 9) B: Propulsion Integration (Raymer Ch 10)
Week 7: 12 July - 16 July	Lecture	A: Structures (Raymer Ch 14) B: Materials (Raymer Ch 14)
Week 8: 19 July - 23 July	Lecture	A: Weight & Balance (Raymer Ch 15) B: Stability & Control (Raymer Ch 16, Roskam Part V)
Week 9: 26 July - 30 July	Lecture	A: Performance (Raymer Ch 17) B: Cost Analysis (Raymer Ch 18, Roskam Part VIII)
Week 10: 2 August - 6 August	Presentation	Design Presentations

Resources

Prescribed Resources

- Daniel P. Raymer, Aircraft Design: A Conceptual Approach, Fifth Edition, AIAA Education Series, 2012

Recommended Resources

- Jan Roskam, Airplane Design Parts I-VIII, DARcorporation
- Jane's All the World's Aircraft (online database available via UNSW Library)
- Federal Aviation Regulations, FAR 23, Airworthiness Standards: Normal Category Airplanes
- Federal Aviation Regulations, FAR 25, Airworthiness Standards: Transport Category Airplanes
- Ian Moir and Allan Seabridge, Aircraft Systems – Mechanical, electrical, and avionics subsystems integration, Third Edition, AIAA Education Series 2008
- Ian Moir and Allan Seabridge, Design and Development of Aircraft Systems, Second Edition, AIAA Education Series 2013
- FAA-H-8083 Aviation Maintenance Technician Handbook - Airframe
- Jean-Claude Flabel, Practical Stress Analysis for Design Engineers, First Edition, Lake City Publishing Company 1997
- E. F. Bruhn, Analysis and Design of Flight Vehicle Structures, Jacobs Publishing, Inc. 1973
- Michael C. Y. Niu, Airframe Structural Design, Second Edition, Hong Kong Conmilit Press Ltd. 2006
- DOT/FAA/AR-MMPDS, Metallic Materials Properties Development and Standardization (MMPDS), (previously MIL-HDBK-5)
- CMH-17, Composite Materials Handbook, (previously MIL-HDBK-17)

Leganto Reading List available via the course [Moodle](#).

UNSW Library website: <https://www.library.unsw.edu.au/>

Moodle: <https://moodle.telt.unsw.edu.au/login/index.php>

Course Evaluation and Development

In this course, recent improvements resulting from student feedback include:

- Weekly meetings to be alternated week to week for each team, to enable improved use of demonstrator and meeting time.
- Final Design Report due date is in Week 12 to maximise the time available for the project, and to allow feedback from the Design Presentations to be incorporated.

Laboratory Workshop Information

If you would like to use the UNSW MakerSpaces to construct your aircraft model, be sure to complete the following MakerSpace badges early in Term:

- Makerspace Safety Induction Badge
- Digital Fabrication Badge

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 20 percent (20%) 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.

Work submitted after the 'deadline for absolute fail' is not accepted and a mark of zero will be awarded for that assessment item.

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.

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.

On-campus class attendance

Public distancing conditions must be followed for all face-to-face classes. To ensure this, only students enrolled in those classes will be allowed in the room. No over-enrolment is allowed in face-to-face classes. Students enrolled in online classes can swap their enrolment from online to a **limited** number of on-campus classes by Sunday, Week 1. Please refer to your course's Microsoft Teams and Moodle sites for more information about class attendance for in-person and online class sections/activities.

Your health and the health of those in your class is critically important. You must stay at home if you are sick or have been advised to self-isolate by [NSW health](#) or government authorities. Current alerts and a list of hotspots can be found [here](#). **You will not be penalised for missing a face-to-face activity due to illness or a requirement to self-isolate.** We will work with you to ensure continuity of learning during your isolation and have plans in place for you to catch up on any content or learning activities you may miss. Where this might not be possible, an application for fee remission may be discussed. Further information is available on any course Moodle or Teams site.

In certain classroom and laboratory situations where physical distancing cannot be maintained or there is a high risk that it cannot be maintained, face masks will be considered **mandatory PPE** for students and staff.

For more information, please refer to the FAQs: <https://www.covid-19.unsw.edu.au/safe-return-campus-faqs>

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](#)

Important Links

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

Image Credit

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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.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	
PE1.3 In-depth understanding of specialist bodies of knowledge within the engineering discipline	✓
PE1.4 Discernment of knowledge development and research directions within the engineering discipline	✓
PE1.5 Knowledge of engineering design practice and contextual factors impacting the engineering discipline	✓
PE1.6 Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline	✓
Engineering application ability	
PE2.1 Application of established engineering methods to complex engineering problem solving	✓
PE2.2 Fluent application of engineering techniques, tools and resources	
PE2.3 Application of systematic engineering synthesis and design processes	✓
PE2.4 Application of systematic approaches to the conduct and management of engineering projects	✓
Professional and personal attributes	
PE3.1 Ethical conduct and professional accountability	
PE3.2 Effective oral and written communication in professional and lay domains	✓
PE3.3 Creative, innovative and pro-active demeanour	✓
PE3.4 Professional use and management of information	✓
PE3.5 Orderly management of self, and professional conduct	✓
PE3.6 Effective team membership and team leadership	✓