



UNSW Course Outline

AERO3110 Aerospace Design 1 - 2024

Published on the 21 May 2024

General Course Information

Course Code : AERO3110

Year : 2024

Term : Term 2

Teaching Period : T2

Is a multi-term course? : No

Faculty : Faculty of Engineering

Academic Unit : School of Mechanical and Manufacturing Engineering

Delivery Mode : In Person

Delivery Format : Standard

Delivery Location : Kensington

Campus : Sydney

Study Level : Undergraduate

Units of Credit : 6

Useful Links

[Handbook Class Timetable](#)

Course Details & Outcomes

Course Description

Aerospace Design 1 provides students with a grounding in aerospace design, in terms of both structural design and aerospace systems. In this course, you will consider the safe design of aerospace structures, through learning to access and use approved material data, understanding

critical regulations, applying appropriate safety factors, and combining this with detailed structural analysis to produce technical design reports. You will also be introduced to a range of aerospace systems, and delve into the design drivers and redundancy requirements for flight safety, as well as exploring different systems implementations for mission requirements. To consolidate learning, the final experiential project requires you to work in small teams to design, manufacture, and test to failure a representative aerospace part, demonstrating structural strength requirements.

Students are expected to have a sound understanding of engineering design and drawing, statics and free body diagrams, manufacturing, aerospace structural analysis, and flight performance prior to attempting this course.

Course Aims

This course aims to build on students' aerospace and engineering fundamentals while providing a grounding in safe aerospace design, in terms of both structural design and aerospace systems. Students are expected to develop their ability to apply their disciplinary knowledge to solve new design challenges, create technical reports, communicate their expertise, and work both independently and in small teams. An experiential learning opportunity is provided to strengthen understanding of aerospace manufacturing and consolidate students' aerospace design capability.

Relationship to Other Courses

Prerequisites

DESN2000 Engineering Design and Professional Practice OR MMAN2100 Engineering Design 2 AND ENGG2400 OR MMAN2400 Mechanics of Solids 1

Assumed Knowledge

Students are expected to have a sound understanding of engineering design and drawing, statics and free body diagrams, manufacturing, aerospace structural analysis, and flight performance prior to attempting this course.

Other Courses

This course is also complementary to AERO3410 Aerospace Structures. Your knowledge of aircraft systems and avionics will be further developed in AERO4620 Dynamics of Aerospace

Vehicles, Systems and Avionics. AERO3110 Aerospace Design 1 focusses on detailed design. Later, your design skills will be further developed with conceptual and preliminary aircraft design in AERO4110 Aerospace Design 2.

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Design an aerospace structure to meet regulatory requirements and a given design brief.
CLO2 : Evaluate and justify systems selection and implementation for a variety of aerospace systems.
CLO3 : Identify appropriate engineering data sources and regulations and apply in the context of aerospace design.

Course Learning Outcomes	Assessment Item
CLO1 : Design an aerospace structure to meet regulatory requirements and a given design brief.	<ul style="list-style-type: none">• Design Problems• Quizzes• Design-Build-Test (Team)
CLO2 : Evaluate and justify systems selection and implementation for a variety of aerospace systems.	<ul style="list-style-type: none">• Design Problems• Quizzes
CLO3 : Identify appropriate engineering data sources and regulations and apply in the context of aerospace design.	<ul style="list-style-type: none">• Design-Build-Test (Team)• Design Problems• Quizzes

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Microsoft Teams

Other Professional Outcomes

An important part of the global aerospace industry, but particularly the Australian aerospace industry, is aircraft repair and modifications. This course will expose students to various aspects of this type of work.

Additional Course Information

Platforms and Communication

Aerospace Design 1 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. I will do my best to respond to all queries in two business days.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Design Problems Assessment Format: Individual	45%	Start Date: Not Applicable Due Date: Not Applicable
Quizzes Assessment Format: Individual	20%	Start Date: Not Applicable Due Date: Not Applicable
Design-Build-Test (Team) Assessment Format: Group	35%	Start Date: Not Applicable Due Date: 12/08/2024 11:50 PM

Assessment Details

Design Problems

Assessment Overview

Design Problem 1 (15%) - Truss

Design Problem 2 (15%) - Doubler

Design Problem 3 (15%) - Systems

Assessments to be completed per design problem brief and Marking Schemes/Rubrics.

Course Learning Outcomes

- CL01 : Design an aerospace structure to meet regulatory requirements and a given design brief.
- CL02 : Evaluate and justify systems selection and implementation for a variety of aerospace systems.
- CL03 : Identify appropriate engineering data sources and regulations and apply in the context of aerospace design.

Detailed Assessment Description

Design Problem 1: Truss: Due 11:50pm Wednesday Week 4

Design Problem 2: Doubler: Due 11:50pm Wednesday Week 7

Design Problem 3: Systems: Due 11:50pm Wednesday Week 10

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

Assessment Length

An average student would be expected to spend around 20 hours per Design Problem.

Submission notes

Report submission via Moodle.

Assessment information

Marks will be returned 2 weeks after submission.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Quizzes

Assessment Overview

Design Quiz (10%) - Structures

TBL Quizzes (10%) - Systems

Assessments to be completed per quiz assessment briefs, including marks allocation.

Course Learning Outcomes

- CL01 : Design an aerospace structure to meet regulatory requirements and a given design brief.
- CL02 : Evaluate and justify systems selection and implementation for a variety of aerospace systems.
- CL03 : Identify appropriate engineering data sources and regulations and apply in the context of aerospace design.

Detailed Assessment Description

Design Quiz (10%): Structures:

- Tuesday Week 3, during the lecture. 30 minutes.

- Individual only

Team Based Learning (TBL) Quizzes (10%): Systems:

- Tuesday's of Weeks 5, 7, and 8, during the lecture. 1 hour each.

- Individual component AND team component. Teams of 4 to 5 students

Submission notes

In-class (Structures and Systems TBL), and including Moodle submission for Systems TBL.

Assessment information

Quizzes will occur in scheduled **face-to-face** classes.

Marks are returned 2 weeks after each quiz.

Assignment submission Turnitin type

Not Applicable

Design-Build-Test (Team)

Assessment Overview

Team project. The maximum length of the assessment is 20 pages. Maximum pages excludes front matter, references and appendices.

Design-Build-Test of typical aerospace structure.

Marking:

1. The team assessment mark will be arrived at using the Marking Scheme provided with the DBT project brief.
2. The team assessment mark will be moderated by marker assessment of individual contributions, peer evaluation, and academic review to give an individual mark for the assessment.
3. For the team 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 the assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment (the penalty is applied to the individual mark).
4. For the team assessment, a peer evaluation must be completed electronically. Peer evaluations for the Design-Build-Test project must be completed by the advised deadline. Failure to complete the peer evaluation by the required deadline for the assessment will result in an individual penalty of 10% of the maximum mark possible for the assessment (the penalty is applied to the individual mark).

Course Learning Outcomes

- CL01 : Design an aerospace structure to meet regulatory requirements and a given design brief.
- CL03 : Identify appropriate engineering data sources and regulations and apply in the context of aerospace design.

Detailed Assessment Description

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

Lab Participation:

This hands-on project requires physical participation and attendance. You must be on time for each appointment, or risk ejection or non-completion of the activity. You will not swap sessions or attend alternate sessions for safety reasons.

You will be trained to use manufacturing tools in Lab 1 (Weeks 2 to 4, at the UTL, see your timetable).

You will manufacture your designed component in Lab 2, during the Weeks 8 and 9 sessions (at the UTL, see your timetable).

You will test your manufactured component in Lab 2, during the Week 10 session (see your timetable).

Failure to complete Lab 1 during your enrolled lab session forfeits 5% of this assessment (or 1.75% of the course total). Failure to complete Lab 1 prohibits you from manufacturing anything in Lab 2 for safety. You will not be trained during Lab 2 for safety. Your physical participation (attendance) in the all Labs (but **especially Week 10**) constitute part of the assessment for your Design-Build-Test project.

Lab Special Considerations:

If you missed any of your scheduled Lab sessions for any valid reason (medical, misadventure etc.), you should apply for special considerations. This is especially true for Lab 1, and your Lab 2 Week 10 session. UNSW Special Considerations needs to know that this is part of your completion of a lab or practical assignment. UNSW Special Considerations will not grant consideration for attendance alone. Any rejection by UNSW Special Considerations will be obeyed and will therefore not grant you any further rights.

If you have been granted special considerations for Lab 1, a make-up lab session will be arranged

in Week 6. To avoid forfeiting 5% of this assignment you will need to complete this make-up lab session during Week 6. This allows you to proceed with manufacturing during Lab 2.

If you have NOT been granted special considerations, you may still attend a make-up lab session in Week 6 for Lab 1. However, your inclusion is subject to availability and is not guaranteed. If you complete Lab 1 during Week 6 (without special considerations), then you will be allowed to manufacture in Lab 2, but will still forfeit 5% of this assignment.

Assessment Length

20 pages (maximum).

Submission notes

Test piece physical submission: In-class; Report submission via Moodle.

Assessment information

For the team assessment of the Design-Build-Test project, a **peer evaluation** AND an individual **statement of claim** must be completed. Failure to complete either by the required deadlines will result in an individual penalty of **10%** of the maximum mark possible (or 3.5% of the course grade), for **each of these two items**. The penalty is applied to the individual mark.

Your peer evaluation and individual statement of claim are vital for the fair distribution of marks to individuals within a team.

The individual statement of claim is due on August 12th, 11.50 pm (same as the report).

The peer evaluation is due on August 16th, 11.50 pm.

Assignment submission Turnitin type

This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

General Assessment Information

Simple Editing Assistance

For assessments in this course, you may use standard editing and referencing software, but not generative AI. You are permitted to use the full capabilities of the standard software to answer the question (e.g. Microsoft Office suite, Grammarly, EndNote, Zotero, etc.).

If the use of generative AI such as ChatGPT is detected, it will be regarded as **serious academic**

misconduct and subject to the standard penalties, which may include 00FL, suspension and exclusion.

Grading Basis

Standard

Course Schedule

Teaching Week/Module	Activity Type	Content
Week 1 : 27 May - 2 June	Lecture	A: Course Introduction. Design Process and Reviews B: Structures - Regulations and Load Factors (FAR 23) C: Structures - Structural Loads and Free Body Diagrams (FAR 23)
Week 2 : 3 June - 9 June	Lecture	A: Structures - Aerospace Structural Design (FAR23) B: Structures - Failure Types and Material Data (MMPDS & CMH-17) C: Structures - Trusses (Bruhn A2.9 & A2.10 & Flabel 1.10)
Week 3 : 10 June - 16 June	Lecture	A: Structures - Beams (Flabel 1.4, 1.5, 1.6, 1.7, Ch 2) B: Structures - Cut Outs & Doublers (Niu Ch 6 & Flabel Ch 9)
	Assessment	C: Structures - Quiz - Structural Design. During Tuesday's lecture.
Week 4 : 17 June - 23 June	Lecture	A: Structures - Joints & Fasteners (Bruhn D1 & Flabel Ch 3) B: Structures - Lugs (Bruhn D1) C: Structures - Structural Design Review
Week 5 : 24 June - 30 June	Lecture	A: Systems - Types of Aircraft Systems (Moir & Seabridge 2013 Ch 2) B: Systems - Systems Design Considerations (FAR §23.2510, FAR §23.1309, Moir & Seabridge 2013 §6.5 & Moir & Seabridge 2008 Ch 8)
	Assessment	C: Systems - TBL Quiz Hydraulic Systems (Moir & Seabridge 2008 Ch 4). During Tuesday's lecture.
Week 6 : 1 July - 7 July	Other	Flexibility Week. Make-up Lab 1.
Week 7 : 8 July - 14 July	Lecture	A: Systems - Flight Control Systems (Moir & Seabridge 2008 Ch 1) B: Systems - Electrical Systems (Moir & Seabridge 2008 Ch 5)
	Assessment	C: Systems - TBL Quiz Avionics Systems (Moir & Seabridge 2008 Ch 12). During Tuesday's lecture.
Week 8 : 15 July - 21 July	Lecture	A: DBT - DBT Support - Manufacture + Consultation (Bruhn D1 & FAA-H-8083) B: Systems - Fuel Systems (Moir & Seabridge 2008 Ch 3)
	Assessment	C: Systems - TBL Quiz Communication Systems (Pisacane Ch 9). During Tuesday's lecture.
Week 9 : 22 July - 28 July	Lecture	A: DBT - DBT Support - Testing + Consultation B: Systems - Case Study - Boeing 737 MAX (Lion Air Flight 610 Preliminary Report & Ethiopian Airlines Flight 302 Preliminary Report)
Week 10 : 29 July - 4 August	Lecture	Guest Lecture TBC Consultation

Attendance Requirements

Students are strongly encouraged to attend all lectures or review lecture recordings.

Attendance is required at all workshops and labs. If your absence equates to more than 20% of workshops and labs, you may fail the course, or be denied special consideration.

You must be available for all assessments. Quizzes and Team Based Learning sessions occur in scheduled face-to-face Lecture times. Your physical participation (attendance) in the all Labs (but **especially Week 10**) constitute part of the assessment for your Design-Build-Test project.

Course Resources

Prescribed Resources

- Jean-Claude Flabel, Practical Stress Analysis for Design Engineers, First Edition, Lake City Publishing Company 1997
- Ian Moir and Allan Seabridge, Aircraft Systems: Mechanical, electrical, and avionics subsystems integration, Third Edition, AIAA Education Series 2008

Recommended Resources

- E. F. Bruhn, Analysis and Design of Flight Vehicle Structures, Jacobs Publishing, Inc. 1973
- Ian Moir and Allan Seabridge, Design and Development of Aircraft Systems, Second Edition, AIAA Education Series 2013
- Vincent L. Pisacane, Fundamentals of Space Systems, Second Edition, Oxford University Press 2005
- FAA-H-8083 Aviation Maintenance Technician Handbook - Airframe
- Michael C. Y. Niu, Airframe Structural Design, Second Edition, Hong Kong Conmilit Press Ltd. 2006
- Warren C. Young and Richard G. Budynas, Roark's Formulas for Stress and Strain, Seventh Edition, 2002
- Federal Aviation Regulations, FAR 23, Airworthiness Standards: Normal Category Airplanes
- Federal Aviation Regulations, FAR 25, Airworthiness Standards: Transport Category Airplanes
- DOT/FAA/AR-MMPDS, Metallic Materials Properties Development and Standardization (MMPDS)
- CMH-17, Composite Materials Handbook

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

Feedback on the course is gathered periodically using various means, including the UNSW myExperience process, informal discussions with students inside and outside of class, 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.

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

- Development and enhancement of workshop activities to support the design problems.
- CATIA module removal as a formal component of the course.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Jiawei Tan		J17 408		Contact via Teams or Email	Yes	Yes
Lecturer	Sonya Brown		J17 408D			No	No
Demonstrator	Justin Malkki		J17 408			No	No
	Sophia Nicole Pablo		J17 408			No	No
	Justin van Hulsen-Akouri					No	No
	Othman Abu Laban		J17 208			No	No

Other Useful Information

Academic Information

I. Special consideration and supplementary assessment

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, or within 3 working days of, submitting an assessment or sitting an exam.

Please note that UNSW has a Fit to Sit rule, which means that if you sit an exam, 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](#).

II. Administrative matters and links

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](#)
- [Equitable Learning Services](#)

III. Equity and diversity

Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course convener prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equitable Learning Services. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

IV. Professional Outcomes and Program Design

Students are able to review the relevant professional outcomes and program designs for their streams by going to the following link: <https://www.unsw.edu.au/engineering/student-life/student-resources/program-design>.

Note: This course outline sets out the 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 or your primary learning management system (LMS) 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/Moodle/LMS, the description in the Course Outline/Moodle/LMS applies.

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.

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 or contract cheating) even suspension from the university. The Student Misconduct Procedures are available here:

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

Submission of Assessment Tasks

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

- Weekly online tests or laboratory work worth a small proportion of the subject mark;
- Exams, peer feedback and team evaluation surveys;
- Online quizzes where answers are released to students on completion;
- Professional assessment tasks, where the intention is to create an authentic assessment that has an absolute submission date; and,
- Pass/Fail assessment tasks.

Faculty-specific Information

[Engineering Student Support Services](#) – The Nucleus - enrolment, progression checks, 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

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)

School-specific Information

Short Extensions

Short extensions are not currently applicable to Mechanical and Manufacturing Engineering Courses.

Review of Results

The purpose of a review of results is if there was a marking error. Review of results is for when you have cause to believe that there is a marking error. Review of Results cannot be used to get feedback. If you would like feedback for assessments prior to the final exam, you are welcome to contact the course convenor directly. No feedback will be provided on final exams.

Use of AI

The use of AI is prohibited unless explicitly permitted by the course convenor. Please respect this and be aware that penalties will apply when unauthorised use is detected, such as through Turnitin. If the use of generative AI, such as ChatGPT, is allowed in a specific assessment, they must be properly credited, and your submissions must be substantially your own work.

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](#)