UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Term 2 2020

AERO4110

Aerospace Design 2

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Dr Sonya A Brown
Email: sonya.brown@unsw.edu.au
Microsoft Teams: AERO4110 class Teams
Moodle: https://moodle.telt.unsw.edu.au/login/index.php

Consultations (Microsoft Teams):
I will be available during all scheduled tutorial times on Microsoft Teams. Additional consultation is available on Thursday's 10-11am following the tutorial session. It is preferred for any queries to be addressed in this time. If this is not possible, please email me to arrange a time to discuss.

Contact details and consultation times for additional lecturers/demonstrators/lab staff

Name: Arthur Tan
Role: Demonstrator
Email: jiawei.tan@unsw.edu.au

Name: Angus Wills
Role: Demonstrator
Email: a.wills@unsw.edu.au

2. Important links

- Moodle
- Lab Access
- Health and Safety
- Computing Facilities
- Student Resources
- Course Outlines
- Engineering Student Support Services Centre
- Makerspace
- UNSW Timetable
- UNSW Handbook
- UNSW Mechanical and Manufacturing Engineering

3. Course details

Credit points

This is a 6 unit-of-credit (UoC) course and involves 5 hours per week (h/w) of scheduled online contact.

The normal workload expectations of a student are approximately 25 hours per term for each UOC, including class contact hours, other learning activities, preparation and time spent on all assessable work.

You should aim to spend about 13 h/w on this course. The additional time should be spent in making sure that you understand the lecture material, completing the set assignments, further reading, and revising for any examinations.

Contact hours

	Day	**Time**	**Delivery Mode**
Lectures	N/A	2 hrs/wk	Online Video – Provided on Moodle and Microsoft Teams (Weeks 1-9)
Tutorials	Wednesday	1pm – 3pm	Microsoft Teams (Weeks 1-9)
	Thursday	9am – 10am	Microsoft Teams (Weeks 1-9)
Presentations	Wednesday Week 10	1pm – 7pm	Online (Platform TBA) (Week 10)

All classes in T2 2020 will be online. Please consult this course's Moodle module for details about delivery.

Summary and Aims 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.

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.

Student learning outcomes

This course is designed to address the learning outcomes below and the corresponding Engineers Australia Stage 1 Competency Standards for Professional Engineers as shown. The full list of Stage 1 Competency Standards may be found in Appendix A.

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.	PE 1.5, PE 2.1, PE 2.3, PE 3.3
2.	Apply aerospace cross-disciplinary principles appropriately for a congruous design.	PE 1.3, PE 1.4, PE 2.3, PE 3.4
3.	Cooperatively manage and contribute to an engineering team.	PE 1.6, PE 2.4, PE 3.5, PE 3.6
4.	Professionally communicate design concepts and information.	PE 3.2, PE 3.3

4. 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. Online lectures will introduce the design project and briefly outline / review some of the required areas for design. Lecture videos will be provided on Moodle and Microsoft Teams, and it is expected that you will watch these each week. 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.

Tutorials will be online using Microsoft Teams, and 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 online to the class and industry representatives to improve professional communication and generate links between students and the local aerospace industry.

5. Course schedule

Week	Topic	Delivery Mode	Suggested Readings
1	Introduction and RFPs Design Process Conceptual Design and Configuration	Online	Jane's All the World's Aircraft Raymer Ch 2
2	Existing Aircraft Comparisons & Weight Sizing	Online	Roskam Part I Ch 2 Raymer Ch 6, §19.3
3	T/W, W/S, Sizing	Online	Raymer Ch 5, Ch 6, §19.4 & §19.5
4	Aerodynamics	Online	Raymer Ch 4, §7.8, §7.9
5	Configuration & Payload	Online	Raymer Ch 7, Ch 8, Ch 9
	Propulsion Integration	Online	Raymer Ch 10
7	Structures & Materials	Online	Raymer Ch 14
8	Weight & Balance	Online	Raymer Ch 15
	Stability & Control	Online	Raymer Ch 16 Roskam Part V
9	Performance	Online	Raymer Ch 17
	Cost Analysis	Online	Raymer Ch 18 Roskam Part VIII

6. Assessment

Assessment overview

Assessment	Group Project? (# Students per group)	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Progress Design Reports (2) (Team [1,2,3,4])	Yes (7-8)	30 pages max [5]	30%	1, 2, 3 and 4	Design report; drawings; design choices; ability to meet RFP; integration of disciplines. Peer evaluation.	1: 11:50pm Monday Week 4	1: 11:50pm Thursday Week 4	Two weeks after submission
		30 pages max [5]				2: 11:50pm Monday Week 8	2: 11:50pm Thursday Week 8	Two weeks after submission
Final Design Report (Team [1,2,3,4])		100 pages max [5]	50%	1, 2, 3 and 4	Design report; drawings; design choices; ability to meet RFP; integration of disciplines. Peer evaluation.	4:00pm Thursday August 20th	N/A	Upon release of final results
Presentation (Team [1,2,3,4]) [6]		TBA	20%	3 & 4	Content; feasibility; presentation skills, verbal communication; clarity. Model and brochure. Peer evaluation.	10am Wednesday Week 10 [6]	N/A	Upon release of final results

Notes:

1. The team mark will be moderated by academic review and peer evaluation to give an individual mark for each assessment.
2. 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.
3. For each assessment, a peer evaluation must be completed electronically. Peer evaluations for the Progress Reports and the Presentation must be completed within one week after each assessment due date. Peer evaluations for the Final Design Report must

be completed by 4:00pm Tuesday August 25th. 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.

4. 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.
5. Maximum page numbers exclude front matter, references, and appendices.
6. Presentations will commence at 1pm on Wednesday of Week 10. Presentation slides, and a soft copy of your brochure, must be submitted electronically. The due time is before the presentations as the PDF copy of your brochure is required prior to allow electronic distribution to industry representatives and UNSW staff attending the presentations. UNSW MakerSpace staff will support 3D printing your models for the presentation – however to achieve this, all files for printing must be delivered to the MakerSpace team by 10am on Tuesday of Week 9 (28th July). MakerSpace staff will submit your physical model on your behalf.

Further assessment details may be found on the course Moodle and Microsoft Teams once released.

Assignments

Presentation

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.

Submission

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:

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

Marking

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.

Attendance

Attendance is required at all online tutorials via Microsoft Teams. If your absence equates to more than 20% of tutorials, 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 5th from 1-7pm. You must be present for the entire event.

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 submitting an assessment or sitting an exam.

Please note that 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.

7. Expected resources for students

Required Texts

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

Recommended Reading

- 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

8. 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.

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.

9. 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

10. Administrative matters and links

All students are expected to read and be familiar with UNSW guidelines and polices. 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

Appendix A: Engineers Australia (EA) Competencies

Stage 1 Competencies for Professional Engineers

	Program Intended Learning Outcomes
PE1: Knowledge and Skill Base	PE1.1 Comprehensive, theory-based understanding of underpinning fundamentals
	PE1.2 Conceptual understanding of underpinning maths, analysis, statistics, computing
	PE1.3 In-depth understanding of specialist bodies of knowledge
	PE1.4 Discernment of knowledge development and research directions
	PE1.5 Knowledge of engineering design practice
	PE1.6 Understanding of scope, principles, norms, accountabilities of sustainable engineering practice
PE2: Engineering Application Ability	PE2.1 Application of established engineering methods to complex 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
PE3: Professional and Personal Attributes	PE3.1 Ethical conduct and professional accountability
	PE3.2 Effective oral and written communication (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