



Mechanical and Manufacturing Engineering

Course Outline

Semester 2 2018

AERO4110

Aerospace Design 2

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1. Staff contact details

Contact details and consultation times for course convenor

Name: Dr Sonya A Brown

Office location: Ainsworth 408D

Tel: (02) 9385 7938

Email: sonya.brown@unsw.edu.au

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

I will attend the last half-hour of each tutorial session. It is preferred for any queries to be addressed in this time. If this is not possible, please email me.

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

Demonstrator details will be provided on the course [Moodle](#).

2. Important links

- [Moodle](#)
- [UNSW Mechanical and Manufacturing Engineering](#)
- [Course Outlines](#)
- [Student intranet](#)
- [UNSW Mechanical and Manufacturing Engineering Facebook](#)
- [UNSW Handbook](#)

3. Course details

Credit Points

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

The UNSW website states “The normal workload expectations of a student are approximately 25 hours per semester for each UoC, including class contact hours, other learning activities, preparation and time spent on all assessable work. Thus, for a full-time enrolled student, the normal workload, averaged across the 16 weeks of teaching, study and examination periods, is about 37.5 hours per week.”

This means that you should aim to spend about 9 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	Location
Lectures	Monday	12pm - 1 hour	Ainsworth 202
	Wednesday	9am - 1 hour	Macauley Theatre E15/1027
Tutorials	Monday	1pm - 2 hours	Mathews 103
	Wednesday	10am - 1 hour	Mathews 103
Presentations	Wednesday Week 13	10am - 3pm	Ainsworth 102 / Ainsworth 202 (TBC)

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

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. Team work, report writing, and presentation skills are a focus to develop important professional skills for industry.

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. Lectures will introduce the design project and briefly outline some of the required areas for design. Detailed technical information relevant to each group's design should be sought outside of class from appropriate engineering sources to make and justify design decisions. Tutorials will include weekly design meetings for each group, plus general time for groups to work together on their projects with teaching staff support. Team work 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 industry representatives to improve professional communication and generate links between students and the local aerospace industry.

5. Course schedule

Note: As this course has been newly re-developed, topics and order are subject to change.

Week	Topic	Suggested Readings
1	Course Outline, RFP explanation and group selection, Design Process	
2	Conceptual Design and Configuration	Raymer Ch 2
3	Existing Aircraft Comparisons & Weights	Roskam Part I Ch 2 Raymer §19.4 & §19.5
4	Sizing	Raymer Ch 6, §19.3
5	Aerodynamics	Raymer Ch 4, §7.8, §7.9
6	Configuration & Payload	Raymer Ch 7, Ch 8, Ch 9
7	Propulsion	Raymer Ch 10
8	Structures & Materials	Raymer Ch 14
9	Systems Integration	Moir & Seabridge
10	Public Holiday - Monday Weight and Balance	Raymer Ch 15 Roskam Part V
11	Stability and Control Performance	Raymer Ch 16, Ch 17
12	Cost Pitching/Presentation	Raymer Ch 18 Roskam Part VIII

6. Assessment

Assessment overview

Assessment	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Progress Design Reports (2) (Group [1,2,3,4])	30 pages max [5]	30%	1, 2, 3 & 4	Design report; drawings; design choices; ability to meet RFP; integration of disciplines. Peer evaluation.	1: 11:50pm Monday Week 5	1: 11:50pm Thursday Week 5	Two weeks after submission
	30 pages max [5]				2: 11:50pm Monday Week 9	2: 11:50pm Thursday Week 9	Two weeks after submission
Final Design Report (Group [1,2,3,4]) [6]	100 pages max [5]	50%	1, 2, 3 & 4	Design report; drawings; design choices; ability to meet RFP; integration of disciplines. Peer evaluation.	4:00pm Friday Week 13 [6]	N/A	Upon release of final results
Presentation (Group [1,2,3,4]) [7]	TBA	20%	3 & 4	Content; feasibility; presentation skills, verbal communication; clarity. Model and brochure. Peer evaluation.	10:00am Wednesday Week 13 [7]	N/A	Upon release of final results

Notes:

1. The group 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.
3. For each assessment, a peer evaluation must be completed electronically. These must be completed by one week after each assessment due date.
4. Weekly design meetings must be documented with minutes; these should be uploaded electronically each week.
5. Max page numbers excludes front matter, references and appendices.
6. The Final Design Report is required to be submitted in hard copy, as well as electronically.
7. Multiple hard copies of your brochure will be required to distribute to audience members. Presentation slides, and a soft copy of your brochure, must be submitted electronically. Your physical model should be presented and submitted at your design presentation.

Further assessment details may be found on the course [Moodle](#) once released.

Assignments

Presentation

All non-electronic submissions should have a standard School cover sheet which is available from this course's Moodle page.

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 per cent (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.

Examinations

There are no tests or examinations in this course. You must be available for the group presentations which will occur on Wednesday, Week 13.

Special consideration and supplementary assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, 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
- 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
- Barnes W. McCormick, Aerodynamics Aeronautics and Flight Mechanics, Second Edition, John Wiley & Sons, Inc. 1995
- 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.

Following an extensive review in 2017, this course has been redesigned for 2018 to be a one semester course, focusing on preliminary design of an aircraft.

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: 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

Further information on School policy and procedures in the event of plagiarism is available on the [intranet](#).

10. Administrative matters and links

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

- [Attendance, Participation and Class Etiquette](#)
- [UNSW Email Address](#)

- [Computing Facilities](#)
- [Assessment Matters](#) (including guidelines for assignments, exams and special consideration)
- [Exams](#)
- [Approved Calculators](#)
- [Academic Honesty and Plagiarism](#)
- [Student Equity and Disabilities Unit](#)
- [Health and Safety](#)
- [Student Support 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