UNSW SYDNEY | Australia's Global University

Mechanical and Manufacturing Engineering

Course Outline

Semester 2 2017

AERO3110

AEROSPACE DESIGN

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Dr John Olsen
Office Location: Ainsworth Building, Rm 311C
Tel: (02) 9385 5217
Email: j.olsen@unsw.edu.au
Moodle: https://moodle.telt.unsw.edu.au/login/index.php

Only use email as a last resort. I would prefer you see me after the lecture if you have a problem.

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

Name: Dr Zoran Vulovic
Office location: Ainsworth Building, Rm 311D
Tel: (02) 9385 6261
Email: z.vulovic@unsw.edu.au

Rick Reid
Invenio Pty. Ltd.
Email: rickr@invenio.com.au

Please see 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	10am-12noon	Ainsworth 102
Lectures	Tuesday	3pm - 5pm	Ainsworth 202
CATIA	Tuesday	5pm - 6pm	Ainsworth 203
Web	Any	Any	Moodle

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

The course builds on the principles taught in science based classes and provides insight into the application of aeronautical engineering knowledge in a practical industrial environment. Students are shown methods used by practicing engineers in the design process and assisted in developing engineering judgement that will be useful to them throughout their careers. They are also introduced to the tools and data sources used by a modern practicing aerospace design engineer.

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.	Carry out a simple aerospace detail design.	PE1.5, PE2.3, PE3.2 & PE3.3
2.	Understand how aerospace structures, flight dynamics, propulsion and systems interact with the design process.	PE1.3, PE3.2 & PE3.3
3.	Have a basic ability to use CATIA.	PE1.5 & PE2.2
4.	An ability to seek out sources of design data and evaluate their reliability and relationship to the safety regulations.	PE1.6 & PE3.1

4. Teaching strategies

Mr Rick Reid will give a series of lectures on a Tuesday evening from 5-6pm on CATIA aimed to make you all competent at using the program. Dr Zoran Vulovic will lecture on the

flight systems section of the course. Dr John Olsen will give an introduction to aerospace design, an introduction to helicopters and will speak about the introduction of more electrification of aircraft. In the final weeks of the session, you will be given an opportunity to put aspects of this course together in a design exercise.

5. Course schedule

Week	Topic	Location	Suggested Readings
1	Flight systems	Ainsworth 102	As required
	Introduction to aerospace design	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
2	Flight systems	Ainsworth 102	As required
	Introduction to aerospace design	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
3	Flight systems	Ainsworth 102	As required
	Introduction to aerospace design	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
4	Flight systems	Ainsworth 102	As required
	Introduction to helicopters	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
5	Flight systems	Ainsworth 102	As required
	Introduction to helicopters	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
6	Flight systems	Ainsworth 102	As required
	Introduction to helicopters	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
7	Flight systems	Ainsworth 102	As required
	“More Electric Aircraft”	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
8	“More Electric Aircraft”	Ainsworth 102	As required
	Flight testing and certification	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
9	Design Exercise	Ainsworth 102	As required
	Flight testing and certification	Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
10	Design Exercise	Ainsworth 102	As required
		Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
11	Design Exercise	Ainsworth 102	As required
		Ainsworth 202	As required
	CATIA	Ainsworth 203	As required
12	Design Exercise	Ainsworth 102	As required
		Ainsworth 202	As required
	CATIA	Ainsworth 203	As required

Please note that this schedule is likely to change at short notice as this course is under re-development.

6. Assessment

Assessment overview

Assessment	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
CATIA Assignment	-	25%	All	Material from CATIA section of course	-	N/A	Upon release of final results
Flight Systems Assignment	-	25%	All	Lecture material from weeks 1-6	Week 7, Monday, Time: 23:50	N/A	Two weeks after submission
Helicopters and Electrification of Aircraft Class Test	1 hour	25%	All	All course content from weeks 2-12 inclusive	Week 8, Monday, Ainsworth 102	N/A	Two weeks after submission
Aircraft Design Assignment	-	25%	All	All aspects of the course	Week 12, Wednesday	N/A	Upon release of final results

Assignments

Presentation

All non-electric 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

Late submissions will be penalised 5 marks per calendar day (including weekends). An extension may only be granted in exceptional circumstances. Special consideration for assessment tasks must be processed through student.unsw.edu.au/special-consideration.

It is always worth submitting late assessment tasks when possible. Completion of the work, even late, may be taken into account in cases of special consideration.

Where there is no special consideration granted, the 'deadline for absolute fail' in the table above indicates the time after which a submitted assignment will not be marked, and will achieve a score of zero for the purpose of determining overall grade in the course.

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 is no final exam for this course

Special consideration and supplementary assessment

For details of applying for special consideration and conditions for the award of supplementary assessment, see the School intranet, and the information on UNSW's Special Consideration page.

7. Attendance

You are required to attend a minimum of 80% of all classes, including lectures, labs and seminars. It is possible to fail the course if your total absences equal to more than 20% of the required attendance. Please see the School intranet and the UNSW attendance page for more information.

8. Expected resources for students

Recommended reading:

E. Torenbeek, Advanced Aircraft Design, Conceptual design, analysis and optimisation of subsonic civil airplanes, Aerospace Series, Wiley, 2013.

Suggestions:

E. Torenbeek & H. Wittenberg, Flight Physics, Essentials of aeronautical disciplines and technology, with historical notes, Springer, 2002.

J.G. Leishman, Principles of Helicopter Aerodynamics, 2nd edition, Cambridge Aerospace Series, Cambridge University Press, 2006.

J. Roskam, Airplane Design: Part IV, Layout design of landing gear and systems, Roskam Aviation and Engineering Corporation, Kansas, 1989.

A.Filippone, Advanced Aircraft Flight Performance, Cambridge University Press, 2012.

D.P. Raymer, Aircraft Design: a conceptual approach, 4th edition, AIAA Education Series, 2006.

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

I. Moir & A. Seabridge, Aircraft Systems, mechanical, electrical, and avionics subsystems integration, Aerospace Series, Wiley, 2008.

UNSW Library website: https://www.library.unsw.edu.au/
Moodle: https://moodle.telt.unsw.edu.au/login/index.php

9. 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.

This course has been redesigned for 2017. It includes new sections on CATIA. The studio section has been dropped. A design exercise will be adopted during the final part of the session.

10. 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.

11. Administrative matters and links

All students are expected to read and be familiar with School guidelines and polices, 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)
- 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