UNSW AUSTRALIA

Course Outline

Semester 1 2016

Never Stand Still | Engineering | Mechanical and Manufacturing Engineering

AVEN1920

INTRODUCTION TO AIRCRAFT ENGINEERING

Contents

1. Staff contact details

Contact details and consultation times for course convenor

Name: Naomi Tsafnat (Aeronautical Engineering)
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Consultation concerning this course is primarily by email. If you would like to meet please email to schedule a meeting time. The course Moodle site has a discussion forum where you can ask questions about the course or the material. Minor matters can be discussed after class.

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

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Tel (02) 9385 4251
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2. Course details

Credit points:

This is a 6 unit-of-credit (UoC) course, and involves 4 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	Tuesday	10am - 12noon	Ainsworth 102
	Friday	2pm - 4pm	Ainsworth 102

Summary of the course

This is an introductory course for the aviation program. Its aim is to set the scene for later engineering studies and familiarise the students with the terms used in aeronautical engineering, while at the same time introducing them to basic engineering mechanics and aerodynamics.

The course is divided into three main parts: mechanics, aerodynamics, and aeronautical engineering.

Aims of the course

This course aims to provide students with a basic understanding of aeronautical engineering principles, and develop skills and problem solving methods in fundamental engineering applications as they apply to aircraft systems. During the course, an overview of the history of aircraft development will be introduced to give context to the current state of aeronautical engineering. Aviation students will gain an understanding of the main issues faced by aeronautical engineers.

Student learning outcomes

This course is designed to address the below learning outcomes 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.	Describe and use the core principles of engineering mechanics to solve basic problems related to aeronautical engineering	1.1, 1.2, 3.2
2.	Describe the basic concepts related to the aerodynamic efficiency of an aircraft, and solve basic problems in aerodynamics as they relate to aircraft performance and airfoil design	1.1, 1.2, 3.2

3.	Demonstrate an understanding of the historical processes that led to the current state of aircraft engineering and technology	1.4, 1.5
4.	Apply basic engineering concepts to the analysis of aircraft systems: structures, powerplants, stability and control, avionics and materials	1.1, 1.2, 3.2

3. Teaching strategies

Lectures in the course are designed to cover the terminology and core concepts and theories. Example problems will be worked out in class and provided on Moodle for you to practice at home. Lecture notes will be provided on Moodle, along with recommended reading.

The Aerodynamic Design component will consist of weekly workshops where students will explore how and why aircraft are designed as they are, and work through their own conceptual designs for four separate aircraft specifications.

4. Course schedule

All lectures are in the Ainsworth building, room 102.

Week	Date	Topic	Lecture Content
1	1/3	Aero Eng	Course introduction Major aircraft components
	4/3	Mechanics	Forces
2	8/3	Aero Eng	Early flight Airfoil nomenclature Lift and drag
	11/3	Mechanics	Forces
3	15/3	Aero Eng	Aeronautics in World War I Reciprocating engines and propellers
	18/3	Mechanics	Moments
4	22/3	Aero Eng	History of propulsion development Jet engines
Mid-semester break			
5	5/4	Aero Eng	Aeroacoustics
	8/4	Mechanics	Equilibrium
6	12/4	Aero Eng	The “golden age” of flight Stability and control
	15/4	Mechanics	Equilibrium
7	19/4	Aero Eng	**Quiz: Aeronautical engineering**
	22/4	Mechanics	Rigid Body Motion
8	26/4	Aero Eng	Aeronautics in World War II Stability and control (cont.)
	29/4	Mechanics	**Quiz: Mechanics**
9	3/5	Aero Eng	Post-WWII aeronautics Aircraft systems and avionics
	6/5	Aerodynamics	Introduction and Workshop 1: Commercial aircraft
10	10/5	Aero Eng	The jet age Aircraft materials
	13/5	Aerodynamics	Workshop 2: High-speed aircraft
11	17/5	Aero Eng	Recent advances in aeronautical engineering Energy height
	20/5	Aerodynamics	Workshop 3: Green aircraft
12	24/5	Aero Eng	Helicopters
	27/5	Aerodynamics	Workshop 4: Drones
13	31/5	Aero Eng	Revision and overflow
	3/6	Aerodynamics	Revision and overflow

5. Assessment

Assessment overview

Assessment	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Marks returned
Quiz, Aeronautical engineering	1 hour	10%	3, 4	Lecture material from Aeronautical engineering stream, weeks 1-6	During week 7, 19/4 in class	Week 9
Quiz, Mechanics	50 minutes	25%	1	Lecture material from Mechanics stream, weeks 1-7	During week 8, 29/4 in class	Week 10
Book report	1000 – 1500 words	10%	3	A summary of the book, and a personal reflection	Due Week 9, May 6 by 2pm, on Moodle. Ensure a signed cover sheet is attached.	Week 12
Aerodynamics design reports	4 x 1-2 page reports	4 x reports, each worth 6.25% (25% total)	2	Conceptual aerodynamic design of 4 aircraft to suit provided specification	4 reports, one due each week, in weeks 10-13	Week 13
Final exam	3 hours	30%	3, 4	All *Aeronautical engineering* **(only)** content from weeks 1 - 12.	Exam period, date TBC	Upon release of final results

You will be assessed by way of assignments and examinations, both of which involve calculations and descriptive material.

Mechanics 25%

The assessment for this part of the course will be based on a test held in week 8 lasting 50 minutes. Only calculators with "approved" stickers will be able to be used for this test.

Aerodynamics 25%

Assessment for this part of the course will be based upon four short aerodynamic design reports, each consisting of 1-2 pages of text and a separate sketch of your design concept, labeling the features that you have thought of to ensure the aircraft will achieve its purpose.

Aeronautical engineering 50%

Assessment for this part of the course comprises one 50-minute in-class quiz in Week 7 (10 marks), a book report due in week 9 (10 marks), and a final exam (30 marks).

In order to pass the course, you must achieve an overall mark of at least 50%.

Assignment – Book report

You are required to choose **one** book from the following list, and submit a report on it. The books are available in the UNSW book shop, and some copies are available at the library. Other options are to purchase the book elsewhere or borrow it from any other library.

The books are:

1. R. Bach, *A Gift of Wings*
2. R. Bach, *Stranger to the Ground*
3. E. K. Gann, *Fate is the Hunter*
4. C. Yeager, *An Autobiography*
5. L. Kessler, *The Happy Bottom Riding Club: The Life and Times of Pancho Barnes*

The report should be written in an **essay** style. In your report, include the following:

- A brief outline of the book – What is it about? How is it structured? Who is the author?
- What is the most memorable part of the book for you? Why?
- Does the book relate to your current or past knowledge about aviation? This could include personal experience, coursework taken, and non-university studies.
- A personal reflection – your thoughts on the book, did you find it interesting? Did it spark any new interests? What are your reactions to it? It is fine to critique the book as long as you back up your claims with well thought-out arguments.

Your report should be typed (not hand written), and at least 1000 words and strictly no more than 1500 words long. Please include a **word count** at the end of the report.

The report should be submitted on Moodle by the due date, with a signed cover sheet. Note that any form of plagiarism (including copying from any source without proper referencing, or copying from other students) will result, at the very least, in 0 points awarded for the report, and in severe cases other actions may be taken (refer to Section 8).

The book report is worth 10 marks. Marks will be given based on the following criteria:

- Was the book summarised in a concise yet thorough manner?
- Was a personal reflection included which shows the student read the book in a meaningful manner?
- Does the report comply with university standards (English language and grammar, professional presentation, adherence to word count)?
- Is the report written clearly, with well-thought out structure?
- Are ideas presented logically and backed up with appropriate arguments?

The Learning Centre provides resources and advice on academic writing and presentation skills, https://student.unsw.edu.au/academic-skills

Presentation

All 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. Presenting them 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. Where an assessment task is worth less than 20% of the total course mark and you have a compelling reason for being unable to submit your work on time, you must seek approval for an extension from the course convenor ***before the due date***. Special consideration for assessment tasks of 20% or greater 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.

Examinations

The Aeronautical engineering quiz will be given in class in week 7. This will be a multiple-choice exam. You are allowed to bring an approved calculator, pencils and erasers only.

The Mechanics quiz will be given in class in week 8. You are allowed to bring an approved calculator and a pen/pencil.

The final exam will be held during the university exam period, and will cover all the material **in the aeronautical engineering stream only.** This will be a multiple-choice exam. You are allowed to bring an approved calculator, pencils and erasers only.

You must be available for all tests and examinations. Final examinations for each course are held during the University examination periods, which are June for Semester 1 and November for Semester 2.

Provisional Examination timetables are generally published on myUNSW in May for Semester 1 and September for Semester 2.
For further information on exams, please see the Exams section on the intranet.

Calculators

You will need to provide your own calculator, of a make and model approved by UNSW, for the examinations. The list of approved calculators is shown at student.unsw.edu.au/exam-approved-calculators-and-computers

It is your responsibility to ensure that your calculator is of an approved make and model, and to obtain an "Approved" sticker for it from the School Office or the Engineering Student Centre prior to the examination. Calculators not bearing an "Approved" sticker will not be allowed into the examination room.

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.

6. Expected resources for students

There is no required textbook for this course. Some suggested resources are available in the library and a few copies are available at the UNSW book shop:

- J.D. Anderson, *Introduction to Flight*.
- W. Langewiesche, *Stick and Rudder*.

Course notes and lecture slides will be available on Moodle.

The discussion forum on Moodle is available for you to ask questions about the course and its content. The discussion forum is intended for you to use with other students enrolled in this course. The course convener will occasionally look at the forum and take note of any frequently-asked questions, and may or may not respond to questions on the forum.

If you wish to explore any of the lecture topics in more depth, then other resources are available and assistance may be obtained from the UNSW Library:
http://info.library.unsw.edu.au/web/services/services.html

7. Course evaluation and development

Feedback on the course is gathered periodically using various means, including the Course and Teaching Evaluation and Improvement (CATEI) 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 changes to the material taught in the streams, and changes to assessment to provide better feedback to students throughout the semester.

8. 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.

9. Administrative Matters

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

Naomi Tsafnat
5 February, 2016

Appendix A: Engineers Australia (EA) Professional Engineer Competency Standards

	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