AERO4620

Dynamics of Aerospace Vehicles and Systems

1.

Contact details and consultation times for course convenor

Name: Dr Zoran Vulovic (course convener)
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Consultations will take place in Dr Vulovic's office. The consultation time slots are:

Monday 16:30-17:30
Friday 14:30-15:30

Consultations are possible outside the set times, but a prior appointment would be preferred. Email, telephone and Moodle discussions can also be used for solving more general issues.

Contact details for laboratory demonstrators

Name: Austin Kong
Email: austin.kong@unsw.edu.au

The consultation time slots will be announced later.

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Credit points

This is a 6 unit-of-credit (UoC) course, and involves 6 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	11am - 2pm	Ainsworth 202
	Thursday	3pm – 6pm	Ainsworth G02
Simulation	By appointment	By appointment	Willis Annex 117

Summary of the Course

For ease of management, the course is organised into three separate parts: Aerospace Systems, Avionics and Flight Dynamics; they will form Modules A, B and C respectively. Module A will run in Weeks 1 – 4 and Modules B and C in Weeks 5 – 12. In addition, there is an individual flight simulation exercise.

The Aerospace Systems part deals with the so-called airframe systems as well as their effect on aircraft's performance. The Avionics segment studies aircraft electronic systems as well as other systems that directly interface with avionics. The Flight Dynamics covers different aspects of aircraft stability and the parameters that affect it. The wind tunnel experiment demonstrates the longitudinal stability, understanding of which is crucial for flight control systems. It also provides a link between the Flight Dynamics and Avionics modules. Finally, the flight simulation experiment demonstrates the operations of auto-pilots and various navigation and communication systems.

Aims of the Course

AERO4620 is an important stepping stone in aerospace engineering education. The knowledge acquired during this course is directly applicable to the group design in AERO4110/4120. On the other hand, Module C of this course directly relates to the performance part of AERO3660; at the same time the stability analysis of flying vehicles presented in this module is based on methods learned in MMAN3200 Linear Systs ane(el)2.6(at)49(s)-2(t)-6

It is very important for fourth year student to be able to use multiple sources. For that reason there is no single textbook to support this course. Instead, only recommended texts are provided and you will be expected to find other relevant books and make use of them. You are welcome to consult your lecturer on this.

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Date	Topic	Lecture Content	Demonstration/ Lab Content	Suggested Readings
Week 1	Control systems. Hydraulic systems and components.	Aerodynamic controls, cockpit controls and transmission media. Hydraulic components.	N/A	Class readings
Week 2	Pneumatic systems and components. Fuel systems and components.	Pneumatic components and comparison with hydraulic counterparts.	N/A	Class readings
Week 3	Cabin environment control	Cabin pressurisation and cabin temperature control	N/A	Class readings
Week 4	Electrical systems and components. Test.	DC and AC systems and components	N/A	Class readings
Week 5	Concept of aircraft stability.	What qualifies an electronic component for avionics? Definitions of aircraft stability.	N/A	Class readings
Week 6	Aircraft sensors. Elevator effectiveness. Static margin.	Classification of different aircraft sensors. Analysis of static stability parameters.	N/A	Class readings
Week 7	Navigation systems. Stick-free-case. Handling and flying qualities.	Dead reckoning and position fixing navigation. Relevance of handling and flying qualities.	N/A	Class readings
Week 8	Automatic flight control. Test.T			

Week 9	Autopilots. Mathematical model of longitudinal dynamic.	Classification of autopilots and their modes. 3-DOF linear longitudinal model.	N/A	Class readings
Week 10	Laboratory	N/A	Determination of longitudinal stability using static wind-tunnel measurements.	Lab handout
Week 11	Cockpit electronics. Mathematical model of lateral dynamics.	Displays and communication systems. 3-DOF linear lateral model.	N/A	Class readings lem DOF lscs

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Assessment Overview

Assessment	Length	Weight	Learning outcomes assessed	Assessment criteria	Due date and submission requirements	Deadline for absolute fail	Marks returned
Tests (2)	50 minutes each	42% (30% and 12% respectively)	3; 1 and 2	Module A (aircraft systems); Module C (static stability, handling and flying qualities)	Weeks 4 and 8 respectively, class time	N/A	Two weeks after the test
Lab report	6 pages	10%	1, 2 and 4	Correct calculation, understanding of theory behind the experiment	Tuesday 23rd May 23:50 (Week 12) via Moodle	Thursday 25th May 23:50	Two weeks after the submission
Simulation	45 minutes	2%	3	Punctuality, discipline, co-operation (Module B)	Week 7 - 13	N/A	One week from the exercise
Final exam	2 hours	46%	1, 2 and 3	Entire Module B and the Dynamic Stability part of Module C.	Exam period, date TBC		Upon release of final results

To pass the course you need to obtain a minimum of 50% in total as well as a minimum of **40% for Module C.**