AERO4620

Dynamics of Aerospace Vehicles, Systems and Avionics

Term One // 2021

School of Mechanical and Manufacturing Engineering // UNSW Engineering

Course Details

Credit Points 6

Summary of the Course

Power, mass and information transfer. Fluidic, mechanical and electrical systems in aerospace vehicles; environment control. Avionics and advanced aircraft systems; computer-aided vehicle management. Avionics requirements; avionics integration. Airborne sensors. Navigation. Stability and control systems. Cockpit environment. Static and dynamic stability of atmospheric vehicles. Flight control. Handling and flying qualities.

Course Aims

Dynamics of Aerospace Vehicles, Systems and Avionics is a higher level Aerospace Engineering course in which the fundamental concepts grasped in 3rd year are integrated, applied and extended.

This course focuses on how the aircraft behaves as a time-dependent SYSTEM. It aims to teach you

classroom teaching will be supported by lecture notes available online. They will contain brief outlines of the most important points as well as links to the more detailed sources.

Additional Course Information

This is a 6 unit-of-credit (UoC) course and involves seven hours per week (h/w) of face-to-face 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 12 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.

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 – 3 and Modules B and C in Weeks 4 – 10. 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 electronics. 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.

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. 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 Systems and Control. The large majority of this class has been involved in flight experiments that provide a crucial link between the theoretical knowledge gained during the class time and real flight situations. Students are also able to observe the functioning of systems found in General Aviation aircraft. All these components largely contribute to developing necessary engineering skills and knowledge.

Assessment

HURDLE REQUIREMENT

In order to pass the course, you also have to obtain a total of at least 50% (22 marks) for the Module C: Test 2 (12%) + Lab report (14%) + Module C part of the final exam (18%).

Assessment Tasks

Assessment task	Weight	Due Date	Student Learning Outcomes Assessed
Final exam	46%	Not Applicable	1, 2, 3, 4
Tests	40%	Not Applicable	1, 2, 3, 4
Lab Report	14%	20/04/2021 11:50 PM	1, 4

Assessment Details

Assessment 1: Final exam

Start date: Not Applicable

Details:

Final exam testing the entire Module B as well as dynamic stability.

Assessment 2: Tests

Start date: Not Applicable

Details:

Test 1 on the entire Module A (30%), Test 2 on static stability (12%).

Assessment 3: Lab Report

Start date: Not Applicable

Details:

Wind tunnel measurements will be used for assessing the longitudinal stability parameters.

Turnitin setting: This assignment is submitted through Turnitin and students do not see Turnitin similarity reports.

Resources

Prescribed Resources

There is no textbook for the course. PowerPoint slides will be available on Moodle for Modules A and B lectures but students are expected to use various sources.

Recommended Resources

Aviation Theory Centre (Melbourne, Vic.) 2012a, “Aircraft general knowledge and aerodynamics for the CASA PPL and CPL day VFR syllabus”, Huntingdale, Vic.: Aviation Theory Centre

Collinson, R. – “Introduction to Avionics”, 1st ed., London; New York: Chapman & Hall

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Submission of Assessment Tasks

Assessment submission and marking criteria

Should the course have any non-electronic assessment submission, these should have a standard School cover sheet.

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.

assessment performance, you are eligible to apply for Special Consideration prior to submitting an assessment or sitting an exam.

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.

Please note that students will not be required to provide any documentary evidence to support absences from any classes missed because of COVID-19 public health measures such as

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. *Nj_eg_pgqk _r SLQU gq bcdglcb _q sqgle rfc umpbq mp gbc_q md mrfcpq _lb n_qqgle rfck mdd _q wmsp mul,*

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

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
- Equitable Learning Services

Image Credit

Synergies in Sound 2016

CRICOS

CRICOS Provider Code: 00098G

Acknowledgement of Country

We acknowledge the Bedegal people who are the traditional custodians of the lands on which UNSW Kensington campus is located.

Appendix: Engineers Australia (EA) Professional Engineer Competency Standard

Program Intended Learning Outcomes	
Knowledge and skill base	
PE1.1 Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline	
PE1.2 Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline	

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