Module Descriptor

Title	Aircraft Aerodynamics, Structures and Systems		
Session	2025/26	**Status**	Published
Code	ENGG07011	**SCQF Level**	7
Credit Points	20	**ECTS (European Credit Transfer Scheme)**	10
School	**Computing, Engineering and Physical Sciences**		
Module Co-ordinator	T Leslie		

Summary of Module

One of the most noteworthy and complex facets of aircraft engineering is the interaction of the aerodynamics with the aircraft's structures and systems. In order for an understanding of these complex interactions to be developed by the student this module is introduced early in the aircraft engineering programme. It is intended to provide a holistic understanding of the design, function and operation of an aircraft's significant structures and the systems and how the aerodynamic interactions affect their design and sustainability. This approach will enable relations between the three themes of the module to made and foundations to be laid for deeper study later in the programme. The importance of human factors on flight deck design and operation is identified in the aircraft systems sections of the module whilst the impact that the weather has on the aircraft is presented.

Outcome 1 is intended to provide the student with a knowledge of the subject of aircraft aerodynamics and develop the awareness of the flight environment and how the aerodynamic forces (lift and drag) are generated and affect an aircraft. The significance of different weather types on the aircraft is also identified.

Outcome 2 is intended to provide the student with an understanding of the design and construction of significant structural items, their construction techniques and materials and to the main aerodynamic and other significant loads they are subjected to.

Outcome 3 is intended to provide the student with an introduction to significant modern aircraft systems. An understanding will be provided of the function and operation of the main aircraft flight, fluid and propulsion systems for a modern aircraft and which aspects of aerodynamics affect their design and operation. The interaction of the human and the flight deck instruments and flight deck environment are examined from a human factors and design perspective.

During the course of this module students will develop their UWS Graduate Attributes (https://www.uws.ac.uk/current-students/your-graduate-attributes/) in the following areas-

Universal: Academic - Critical thinking, analytical & inquiring mind; Personal- Ethical; Professional- Socially responsible Work-Ready: Academic - Knowledgeable, Digitally Literate, Problem Solver; Personal - Effective Communicator; Professional - Ambitious Successful : Academic - Autonomous; Personal - Resilient; Professional- Driven

This module has been reviewed and updated, taking cognisance of the University's Curriculum Framework principles. Examples of this are found within the module such as active and engaging laboratory and tutorial activity, weekly formative assessment scaffolding towards end of module summative assessment, industry visit/guest speakers adding to the authenticity of the module content, recorded lecture content supporting students to organise

their own study periods and the use of integrated group activities supporting learning communities- particularly useful as this is an entry level programme module

Module Delivery Method	**On-Campus**[1] ☒	**Hybrid**[2] ☐	**Online**[3] ☐	**Work -Based Learning**[4] ☐

Campuses for Module Delivery	☐ Ayr ☐ Dumfries		☐ Lanarkshire ☐ London ☒ Paisley		☐ Online / Distance Learning ☐ Other (specify)	
Terms for Module Delivery	Term 1	☐	Term 2	☒	Term 3	☐
Long-thin Delivery over more than one Term	Term 1 – Term 2	☐	Term 2 – Term 3	☐	Term 3 – Term 1	☐

Learning Outcomes	
L1	Analyse aircraft flight through lift generation and drag formation.
L2	Describe the design and construction of an aircraft's significant structural items.
L3	Analyse the design, function and operation of significant aircraft systems.
L4	N/A
L5	N/A

Employability Skills and Personal Development Planning (PDP) Skills	
SCQF Headings	**During completion of this module, there will be an opportunity to achieve core skills in:**
Knowledge and Understanding (K and U)	**SCQF 7** A broad knowledge and understanding of aircraft aerodynamics, structures and systems. A general understanding of the effect that the aerodynamics have on the design and construction of the structure and systems. A specific knowledge and understanding of the materials, form and function associated with the structures and systems.

[1] Where contact hours are synchronous/ live and take place fully on campus. Campus-based learning is focused on providing an interactive learning experience supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus contact hours will be clearly articulated to students.

[2] The module includes a combination of synchronous/ live on-campus and online learning events. These will be supported by a range of digitally-enabled asynchronous learning opportunities including learning materials, resources, and opportunities provided via the virtual learning environment. On-campus and online contact hours will be clearly articulated to students.

[3] Where all learning is solely delivered by web-based or internet-based technologies and the participants can engage in all learning activities through these means. All required contact hours will be clearly articulated to students.

[4] Learning activities where the main location for the learning experience is in the workplace. All required contact hours, whether online or on campus, will be clearly articulated to students

	A broad knowledge and understanding of the aircraft flight environment, flight manoeuvres, flight deck instruments and related human factors. A general understanding of the design of sustainable aircraft and the current pressures on the design of aircraft in that regard.
Practice: Applied Knowledge and Understanding	**SCQF 7** Develop knowledge and understanding through work carried out in a laboratory setting. Develop knowledge and understanding through work carried out in a workshop setting. Select and critically evaluate technical literature and other sources of information to solve complex problems. Many of the aircraft systems are complex and an integrated or systems approach to the solution of complex problems/issues associated will be demonstrated. Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life-cycle of a product or process) and minimise adverse impacts
Generic Cognitive skills	**SCQF 7** Use and critically evaluate a range of approaches to evidence based solutions.
Communication, ICT and Numeracy Skills	**SCQF 7** Develop transferable skills in written communication and ICT by presenting the work undertaken in the laboratory.
Autonomy, Accountability and Working with Others	**SCQF 7** Exercise autonomy and initiative in some activities at a professional level. Develop inclusivity awareness through exercises undertaken in group activity.

Prerequisites	**Module Code**	**Module Title**
	Other	
Co-requisites	**Module Code**	**Module Title**

Learning and Teaching	
In line with current learning and teaching principles, a 20-credit module includes 200 learning hours, normally including a minimum of 36 contact hours and maximum of 48 contact hours. The learning and teaching for this module comprises a series of lectures, laboratories and tutorials. Initial learning for each of the outcomes will be delivered in a lecture manner supported by tutorial and practical aerodynamic & software laboratory activity. Online activities will include discussion forums, online formative quizzes and directed further reading/research tasks. Formative feedback will be provided in the tutorial sessions and through weekly online formative quizzes.	
Learning Activities During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:	**Student Learning Hours** (Note: Learning hours include both contact hours and hours spent on other learning activities)

Lecture / Core Content Delivery	24
Tutorial / Synchronous Support Activity	12
Laboratory / Practical Demonstration / Workshop	12
Independent Study	152
n/a	0
n/a	0
TOTAL	200

Indicative Resources

The following materials form essential underpinning for the module content and ultimately for the learning outcomes:

Sub-sonic wind tunnel approximate cross section 300mm x 300mm or suitable flow modelling software.

Computer laboratory with appropriate aerodynamic analysis software.

Anderson, J.D. (2011) Fundamentals of Aerodynamics. 5th edn. New York: McGraw-Hill Education.

Megson, T.H.G (2016) Aircraft Structures for Engineering Students. 6th edn. Oxford: Elsevier.

Moir, I., Seabridge, A. (2008) Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration (Aerospace Series). 3rd edn. Chichester: Wiley-Blackwell.

Niu, M. (1999) Airframe Structural Design: Practical Design Information. 2nd edn. Hong Kong: Conmilit Press limited.

(N.B. Although reading lists should include current publications, students are advised (particularly for material marked with an asterisk*) to wait until the start of session for confirmation of the most up-to-date material)

Attendance and Engagement Requirements

In line with the Student Attendance and Engagement Procedure, Students are academically engaged if they are regularly attending and participating in timetabled on-campus and online teaching sessions, asynchronous online learning activities, course-related learning resources, and complete assessments and submit these on time.

For the purposes of this module, academic engagement equates to the following:

The School of Computing, Engineering and Physical Sciences considers attendance and engagement to mean a commitment to attending, and engaging in, timetabled sessions. Students will scan their attendance, via the attendance scanners, each time they are on-campus, they will have their attendance recorded in class and they will be expected to login to the VLE several times per week. Students who are unable to attend a timetabled session, due to illness or other circumstance, should notify their Programme Leader. Across the School an 80% attendance threshold is set. Students who fall below this, will be referred to the Student Success Team to see how they can be best supported in their studies.

Equality and Diversity

The University's Equality, Diversity and Human Rights Procedure can be accessed at the following link: UWS Equality, Diversity and Human Rights Code.

Aligned with the University's commitment to equality and diversity, this module supports equality of opportunity for students from all backgrounds and learning needs. Using the VLE,

material will be presented electronically in formats that allow flexible access and manipulation of content. This module complies with University regulations and guidance on inclusive learning and teaching practice. This module has lab-based teaching and as such you are advised to speak to the Module Co-ordinator to ensure that specialist assistive equipment, support provision and adjustment to assessment practice can be put in place, in accordance with the University's policies and regulations.
(N.B. Every effort will be made by the University to accommodate any equality and diversity issues brought to the attention of the School)

Supplemental Information

Divisional Programme Board	**Engineering Physical Sciences**
Overall Assessment Results	☐ **Pass / Fail** ☒ **Graded**
Module Eligible for Compensation	☐ **Yes** ☒ **No** **If this module is eligible for compensation, there may be cases where compensation is not permitted due to programme accreditation requirements. Please check the associated programme specification for details.**
School Assessment Board	Design
Moderator	B Rakhshani
External Examiner	E Tingas
Accreditation Details	This module is part of the IMechE accredited programme BEng/MEng (Hons) Aircraft Engineering.
Module Appears in CPD catalogue	☐ **Yes** ☒ **No**
Changes / Version Number	1.13 Module moved to 2025/26 template, text updated to reflect laboratory hours increased in line with Curriculum Framework, resources list updated to reflect ILR feedback, Attendance and Engagement and EDI statements updated. Delivery Term changed to T2 from T1.

Assessment (also refer to Assessment Outcomes Grids below)
Assessment 1
Assessment Category 1: Class Test (Unseen, Closed Book), Weight – 70%
Assessment 2
Assessment Category 2: Laboratory (Report), Weight - 30%
Assessment 3
N/A
(N.B. (i) Assessment Outcomes Grids for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed. (ii) An indicative schedule listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)

Component 1

Assessment Type	LO1	LO2	LO3	LO4	LO5	Weighting of Assessment Element (%)	Timetabled Contact Hours
Unseen Closed Book (Class Test)	☒	☒	☒	☐	☐	70	2

Component 2							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
Report (Laboratory)	☒	☐	☐	☐	☐	30	12

Component 3							
Assessment Type	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**	**Weighting of Assessment Element (%)**	**Timetabled Contact Hours**
N/A	☐	☐	☐	☐	☐		
Combined total for all components						100%	14 hours

Change Control

What	When	Who
Module Descriptor copied to 2025/26 template, text updated to reflect laboratory hours increased in line with Curriculum Framework, resources list updated to reflect ILR feedback, Attendance and Engagement and EDI statements updated. Delivery Term changed to T2 from T1.	March 2025	T.Leslie