

# University of the West of Scotland

## Module Descriptor

Session: 2024/25

<b>Title of Module: Aircraft Aerodynamics, Structures and Systems</b>			
<b>Code: ENGG07011</b>	<b>SCQF Level: 7 (Scottish Credit and Qualifications Framework)</b>	<b>Credit Points: 20</b>	<b>ECTS: 10 (European Credit Transfer Scheme)</b>
<b>School:</b>	School of Computing Engineering and Physical Sciences		
<b>Module Co-ordinator:</b>	Dr Tony Leslie		
<b>Summary of Module</b>			
<p>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 be 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.</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>During the course of this module students will develop their UWS Graduate Attributes (<a href="https://www.uws.ac.uk/current-students/your-graduate-attributes/">https://www.uws.ac.uk/current-students/your-graduate-attributes/</a>) in the following areas-</p> <p>Universal: Academic - Critical thinking, analytical &amp; 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</p> <p>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</p>			

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.

<b>Module Delivery Method</b>					
<b>Face-To-Face</b>	<b>Blended</b>	<b>Fully Online</b>	<b>HybridC</b>	<b>Hybrid 0</b>	<b>Work-Based Learning</b>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>See Guidance Note for details.</b>					

<b>Campus(es) for Module Delivery</b>						
The module will <b>normally</b> be offered on the following campuses / or by Distance/Online Learning: (Provided viable student numbers permit) (tick as appropriate)						
Paisley:	Ayr:	Dumfries:	Lanarkshire:	London:	Distance/Online Learning:	Other:
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

<b>Term(s) for Module Delivery</b>					
(Provided viable student numbers permit).					
Term 1	<input checked="" type="checkbox"/>	Term 2	<input type="checkbox"/>	Term 3	<input type="checkbox"/>

<b>Learning Outcomes: (maximum of 5 statements)</b>	
At the end of this module the student will be able to:	
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.

<b>Employability Skills and Personal Development Planning (PDP) Skills</b>	
<b>SCQF Headings</b>	During completion of this module, there will be an opportunity to achieve core skills in:
Knowledge and Understanding (K and U)	SCQF Level 7  A broad knowledge and understanding of aircraft aerodynamics, structures and systems.

	<p>A general understanding of the effect that the aerodynamics have on the design and construction of the structure and systems.</p> <p>A specific knowledge and understanding of the materials, form and function associated with the structures and systems.</p> <p>A broad knowledge and understanding of the aircraft flight environment, flight manoeuvres, flight deck instruments and related human factors.</p> <p>A general understanding of the design of sustainable aircraft and the current pressures on the design of aircraft in that regard.</p>	
Practice: Applied Knowledge and Understanding	<p>SCQF Level 7</p> <p>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.</p> <p>Many of the aircraft systems are complex and an integrated or systems approach to the solution of complex problems/issues associated will be demonstrated.</p> <p>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.</p>	
Generic Cognitive skills	<p>SCQF Level 7</p> <p>Use and critically evaluate a range of approaches to evidence based solutions.</p>	
Communication, ICT and Numeracy Skills	<p>SCQF Level 7</p> <p>Develop transferable skills in written communication and ICT by presenting the work undertaken in the laboratory.</p>	
Autonomy, Accountability and Working with others	<p>SCQF Level 7</p> <p>Exercise autonomy and initiative in some activities at a professional level. Develop inclusivity awareness through exercises undertaken in group activity.</p>	
<b>Pre-requisites:</b>	Before undertaking this module the student should have undertaken the following:	
	<table border="1"> <tr> <td><b>Module Code:</b></td> <td><b>Module Title:</b></td> </tr> </table>	<b>Module Code:</b>
<b>Module Code:</b>	<b>Module Title:</b>	

	<b>Other:</b>	
<b>Co-requisites</b>	<b>Module Code:</b>	<b>Module Title:</b>

\*Indicates that module descriptor is not published.

<b>Learning and Teaching</b>	
<p>The learning and teaching for this module comprises a series of lectures, laboratories, tutorials and a company visit. Initial learning for each of the outcomes will be delivered in a lecture manner supported by tutorial and laboratory activity. A company visit to a local airline will be undertaken to provide opportunity to practically demonstrate previous learning.</p> <p>A hybrid delivery will enhance the learning and teaching activity for this module. The hybrid learning will comprise VLE activities to reinforce the lecture content. Online activities will include discussion forums, online formative quizzes and directed further reading/research tasks. An external visit to an industrial setting and guest speakers will complement the lecturers' delivery and ensure currency with contemporary industrial practice. Formative feedback will be provided in the tutorial sessions and through weekly online formative quizzes.</p>	
<p><b>Learning Activities</b> During completion of this module, the learning activities undertaken to achieve the module learning outcomes are stated below:</p>	<p><b>Student Learning Hours</b> (Normally totalling 200 hours): (Note: Learning hours include both contact hours and hours spent on other learning activities)</p>
Lecture/Core Content Delivery	24
Tutorial/Synchronous Support Activity	12
Laboratory	4
Independent Study	160
	Hours Total 200
<b>**Indicative Resources: (eg. Core text, journals, internet access)</b>	
<p>The following materials form essential underpinning for the module content and ultimately for the learning outcomes:</p> <p>Sub-sonic wind tunnel approximate cross section 300mm x 300mm or suitable flow modelling software.</p> <p>Moir, I., Seabridge, A. (2008) Aircraft Systems: Mechanical, Electrical and Avionics Subsystems Integration (Aerospace Series) 3rd Edition ,Chichester, Wiley-Blackwell</p> <p>Anderson, J.D. (2011) Fundamentals of Aerodynamics 5th Edition, New York , McGraw-Hill Education.</p>	

Niu, M. (1999) Airframe Structural Design: Practical Design Information and Data on Aircraft Structures, 2nd Edition, Adaso Adastra Engineering Center

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

(\*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.

### 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](#).

(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

<b>Divisional Programme Board</b>	Engineering and Physical Sciences
<b>Assessment Results (Pass/Fail)</b>	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
<b>School Assessment Board</b>	Engineering
<b>Moderator</b>	Bassam Rakhshani
<b>External Examiner</b>	E Tingas
<b>Accreditation Details</b>	This module is part of the IMechE accredited programme BEng/Meng (Hons) Aircraft Engineering.
<b>Changes/Version Number</b>	1.12 (was 1.11)  Module Delivery Changed to Face-To-Face from Hybrid C. Module hours updated to reflect Curriculum Framework norms. Module Moderator changed to Bassam Rakhshani from Stephanie Docherty.

	Assessment wording amended to reflect a consistent programme terminology.
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<b>Assessment: (also refer to Assessment Outcomes Grids below)</b>
<p>Students will require to engage in a variety of virtual/online reading, discussion forums and quizzes that will enable them to receive feedback on this formative activity, from the lecturer and peers on their understanding. Discussion forums will be monitored to ensure peer feedback is accurate.</p> <p>Formative online tests will be undertaken in relation to Employability and PDP skills.</p> <p>Summative assessment will be in the form of one holistic unseen open book end of module class test, covering Outcomes 1-3 and a report based on laboratory testing undertaken covering Outcome 1.</p> <p>Assessment Category 1: Class Test (Unseen, Closed Book), Weight – 70%</p>
<p>Assessment Category 2: Laboratory (Report), Weight - 30%</p> <p>To pass this module an aggregate mark of at least 40%, with no component of assessment at less than 30%.</p>
<p>(N.B. (i) <b>Assessment Outcomes Grids</b> for the module (one for each component) can be found below which clearly demonstrate how the learning outcomes of the module will be assessed.</p> <p>(ii) An <b>indicative schedule</b> listing approximate times within the academic calendar when assessment is likely to feature will be provided within the Student Module Handbook.)</p>

### Assessment Outcome Grids (See Guidance Note)

Component 1					
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetable Contact Hours
Unseen Closed Book (Class Test)	✓	✓	✓	70	2

Component 2					
Assessment Type (Footnote B.)	Learning Outcome (1)	Learning Outcome (2)	Learning Outcome (3)	Weighting (%) of Assessment Element	Timetable Contact Hours
Laboratory	✓			30	4

<b>Combined Total for All Components</b>	<b>100%</b>	<b>6 hours</b>
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