



## MODULE SPECIFICATION

Part 1: Information			
Module Title	Aero Structures		
Module Code	UFMFX6-15-2	Level	Level 5
For implementation from	2020-21		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Stress & Dynamics 2020-21		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description
<p><b>Educational Aims:</b> The module aims to provide a solid foundation for the design, analysis and evaluation of aircraft structures. The module covers several aspects related to the structural analysis of aircraft structures. The module also aims to provide some fundamental concepts of solid mechanics of materials, stress analysis, idealisation methods and shear flows used in the analysis of aircraft structures.</p> <p><b>Outline Syllabus:</b> Elasticity: including stress and strain in deformable bodies, stress-strain relationship, compatibility and equilibrium equations and failure criteria.</p> <p>Structural Instability: including Euler buckling of columns and tension field beams.</p> <p>Bending, Shear and Torsion of Thin-Walled Beams: including unsymmetrical bending, thin walled beam shear, and open section beam shear and torsion.</p> <p>Structural Idealisation: including structural idealisation and deflection of open and closed section beams.</p> <p>Fatigue of aerospace structures: including fatigue failure criteria, life estimates, endurance limit and cumulative damage.</p>

## STUDENT AND ACADEMIC SERVICES

**Teaching and Learning Methods:** We will focus on applications on aircraft analysis such as wing boxes and fuselage and dimension components for fatigue life and design plates for buckling analysis of some important aircraft components such as spars and skin panels.

The module involves extensive comprehension of stress analysis. Hence, possessing a sound understanding of concepts within the realm of theory of linear elasticity such as stress/strain, principal stresses/strains and Mohr's circle is imperative.

### Part 3: Assessment

This module is assessed via an open book, end of module exam to assess the students' understanding of concepts and techniques.

An assessment on a team-based coursework carrying a weighting (50%) to encourage engagement and focus on application of the theory and stimulate project related work. The delivery for the assessment will be a report of maximum 8 pages for each group and a group presentation.

The group size will be between 5-6 students. There will be a group mark. However, in the case of lack of contribution of team members, the student team is allowed to peer mark each individual moderated by the module leader. Therefore, in such cases, individual marks will be adjusted and distributed based on the level of contribution of each team member complying with group work marking strategy given prior to the issuance of the coursework.

The resit assignment will be for an individual, and thus will consist of a problem to be solved using the taught techniques. The student effort in the resit is the same as each individual is expected to contribute in the first sitting's group activity and will be assessed via a 3 page report and individual presentation.

First Sit Components	Final Assessment	Element weighting	Description
Examination (Online) - Component A	✓	50 %	Online Exam
Report - Component B		25 %	Assessment for practical work (max. 8 pages)
Presentation - Component B		25 %	Group presentation
Resit Components	Final Assessment	Element weighting	Description
Examination (Online) - Component A	✓	50 %	Online Exam
Report - Component B		25 %	Assessment for practical work (max. 3 pages)
Presentation - Component B		25 %	Individual presentation

STUDENT AND ACADEMIC SERVICES

<b>Part 4: Teaching and Learning Methods</b>																	
Learning Outcomes	<p>On successful completion of this module students will achieve the following learning outcomes:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><b>Module Learning Outcomes</b></th> <th style="text-align: left;"><b>Reference</b></th> </tr> </thead> <tbody> <tr> <td>Show a detailed knowledge and understanding of key theoretical principles and results</td> <td>MO1</td> </tr> <tr> <td>Model and solve a range of real aero structures problems</td> <td>MO2</td> </tr> <tr> <td>Apply the knowledge and experience to develop research skills to investigate and solve more complex problems in aero-structures</td> <td>MO3</td> </tr> <tr> <td>Develop and solve simplified mathematical models of the structural design of real aircraft</td> <td>MO4</td> </tr> <tr> <td>Demonstrate key transferable skills in problem formulation and decision-making</td> <td>MO5</td> </tr> </tbody> </table>	<b>Module Learning Outcomes</b>	<b>Reference</b>	Show a detailed knowledge and understanding of key theoretical principles and results	MO1	Model and solve a range of real aero structures problems	MO2	Apply the knowledge and experience to develop research skills to investigate and solve more complex problems in aero-structures	MO3	Develop and solve simplified mathematical models of the structural design of real aircraft	MO4	Demonstrate key transferable skills in problem formulation and decision-making	MO5				
<b>Module Learning Outcomes</b>	<b>Reference</b>																
Show a detailed knowledge and understanding of key theoretical principles and results	MO1																
Model and solve a range of real aero structures problems	MO2																
Apply the knowledge and experience to develop research skills to investigate and solve more complex problems in aero-structures	MO3																
Develop and solve simplified mathematical models of the structural design of real aircraft	MO4																
Demonstrate key transferable skills in problem formulation and decision-making	MO5																
Contact Hours	<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td colspan="2"><b>Independent Study Hours:</b></td> </tr> <tr> <td style="text-align: center;">Independent study/self-guided study</td> <td style="text-align: center;">114</td> </tr> <tr> <td style="text-align: center;"><b>Total Independent Study Hours:</b></td> <td style="text-align: center;">114</td> </tr> <tr> <td colspan="2"><b>Scheduled Learning and Teaching Hours:</b></td> </tr> <tr> <td style="text-align: center;">Face-to-face learning</td> <td style="text-align: center;">36</td> </tr> <tr> <td style="text-align: center;"><b>Total Scheduled Learning and Teaching Hours:</b></td> <td style="text-align: center;">36</td> </tr> <tr> <td><b>Hours to be allocated</b></td> <td style="text-align: center;">150</td> </tr> <tr> <td><b>Allocated Hours</b></td> <td style="text-align: center;">150</td> </tr> </tbody> </table>	<b>Independent Study Hours:</b>		Independent study/self-guided study	114	<b>Total Independent Study Hours:</b>	114	<b>Scheduled Learning and Teaching Hours:</b>		Face-to-face learning	36	<b>Total Scheduled Learning and Teaching Hours:</b>	36	<b>Hours to be allocated</b>	150	<b>Allocated Hours</b>	150
<b>Independent Study Hours:</b>																	
Independent study/self-guided study	114																
<b>Total Independent Study Hours:</b>	114																
<b>Scheduled Learning and Teaching Hours:</b>																	
Face-to-face learning	36																
<b>Total Scheduled Learning and Teaching Hours:</b>	36																
<b>Hours to be allocated</b>	150																
<b>Allocated Hours</b>	150																
Reading List	<p><i>The reading list for this module can be accessed via the following link:</i></p> <p><a href="https://uwe.rl.talis.com/modules/ufmfx6-15-2.html">https://uwe.rl.talis.com/modules/ufmfx6-15-2.html</a></p>																

**Part 5: Contributes Towards**

This module contributes towards the following programmes of study:

Aerospace Engineering [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Design) [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering (Systems) [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies (Design) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies (Design) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering (Design) [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering (Manufacturing) [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies (Design) [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies (Manufacturing) [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies (Systems) [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies (Systems) [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies (Manufacturing) [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies (Design) [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering with Pilot Studies (Manufacturing) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies (Systems) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies (Manufacturing) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies (Systems) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Manufacturing) [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering [Sep][FT][Frenchay][4yrs] MEng 2019-20  
 Aerospace Engineering (Systems) [Sep][SW][Frenchay][5yrs] MEng 2019-20  
 Aerospace Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Design) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Design) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Manufacturing) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Manufacturing) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Systems) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2019-20  
 Aerospace Engineering (Systems) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2019-20  
 Aerospace Engineering with Pilot Studies {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19  
 Aerospace Engineering with Pilot Studies (Design) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19  
 Aerospace Engineering with Pilot Studies (Design) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19  
 Aerospace Engineering with Pilot Studies (Manufacturing) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19  
 Aerospace Engineering with Pilot Studies (Systems) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

## STUDENT AND ACADEMIC SERVICES

Aerospace Engineering with Pilot Studies (Manufacturing) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies (Systems) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Aerospace Engineering (Manufacturing) {Apprenticeship} [Sep][PT][UCW][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Manufacturing) {Apprenticeship} [Sep][PT][UCW][5yrs] BEng (Hons) 2018-19

Aerospace Engineering (Design) {Apprenticeship} [Sep][PT][COBC][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Systems) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Aerospace Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Design) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Manufacturing) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Design) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Aerospace Engineering (Systems) {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Manufacturing) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Aerospace Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20