Module Specification

Aero Structures

Version: 2023-24, v3.0, 25 Jan 2023

Contents

Part 1: Information

Module title: Aero Structures

Module code: UFMFX6-15-2

Level: Level 5

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Stress & Dynamics 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: 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.

Outline syllabus: Elasticity: including stress and strain in deformable bodies, stress-strain relationship, compatibility and equilibrium equations and failure criteria.

Structural Instability: including Euler buckling of columns and tension field beams.

Bending, Shear and Torsion of Thin-Walled Beams: including unsymmetrical bending, thin walled beam shear, and open section beam shear and torsion.

Structural Idealisation: including structural idealisation and deflection of open and closed section beams.

Fatigue of aerospace structures: including fatigue failure criteria, life estimates, endurance limit and cumulative damage.

Part 3: Teaching and learning methods

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.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Show a detailed knowledge and understanding of key theoretical principles and results

MO2 Model and solve a range of real aero structures problems

MO3 Apply the knowledge and experience to develop research skills to investigate and solve more complex problems in aero-structures

MO4 Develop and solve simplified mathematical models of the structural design of real aircraft

MO5 Demonstrate key transferable skills in problem formulation and decision-making

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufmfx6-15-2.html

Part 4: Assessment

Assessment strategy: This module is assessed via a report on practical work designed to ensure that students can apply engineering principles and analysis in context.

The delivery for the assessment will be a report of maximum 12 pages.

The resit assessment will have the same format as the first sit assessment.

Assessment tasks:

Laboratory Report (First Sit)
Description: Assessment for practical work (max. 12 pages)
Weighting: 100 %

Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Laboratory Report (Resit)
Description: Assessment for practical work (max. 12 pages)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Aerospace Engineering Manufacturing [Sep][PT][UCW][3yrs] - Withdrawn FdSc 2021-22

Aerospace Engineering [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering (Systems) [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering (Design) [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering (Manufacturing) [Sep][PT][Frenchay][8yrs] - Not Running MEng 2020-21

Aerospace Engineering with Pilot Studies (Manufacturing) [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Design) [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Systems) [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][PT][Frenchay][6yrs] - Not Running BEng (Hons) 2020-21