Module Specification

Aero Structures

Version: 2024-25, v3.0, 12 Jul 2024

Contents

Part 1: Information

Module title: Aero Structures

Module code: UFMFVU-15-3

Level: Level 6

For implementation from: 2024-25

UWE credit rating: 15

ECTS credit rating: 7.5

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Structural Mechanics 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: The module provides a solid foundation for the design, analysis and evaluation of aircraft structures covering several aspects related to the structural analysis of aircraft structures. The module therefore provides fundamental knowledge that is essential to the role of the structural engineet and supports the application of engineering design principles and analysis at higher levels.

Features: Not applicable

Educational aims: The aim of this module is to provide fundamental concepts of solid mechanics of materials, stress analysis, idealisation methods and shear flows used in the analysis of aircraft structures.

Outline syllabus: Un-symmetric bending of thin walled structures.

Shear of single and multi-cellular thin walled structures.

Torsion of single and multi-cellular thin walled structures.

Analysis of bolted metallic structures.

Structural idealisation.

Buckling of columns.

Buckling of panels.

The concept of safety factors in aircraft design.

Fatigue life calculation of structures.

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 Descibe and explain in detail key theoretical principles and results for the analysis of aero structures (SM1b, SM2b)

MO2 Develop appropriate models and solve a range of real aero structures problems (EA1b, EA2, EA3b)

MO3 Independently research a range of literature resources to investigate and solve more complex problems in aero-structures (EA1b, EA2, EA3b, G1, G4)

MO4 Select and apply appropriate mathematical techniques to analyse the structural design of real aircraft (EA1)

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Lectures = 12 hours

Total = 0

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link

Part 4: Assessment

Assessment strategy: The assessment strategy is designed to ensure that students demonstrate secure knowledge of structural analysis principles and are able to apply that knowledge to problems that wouyld be encountered in aerospace applications.

The assessment for this module is as follows:
A team-based coursework focusing on application of the theory. The output from the assessment task will be a 12 page group report. The group mark for the report will be moderated by a peer review process in accordance with the Department Group Work Policy.

A 2 hour written exam to test understanding of underlying concepts and principles under controlled conditions.

Resit is the same as the first sit

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Assessment tasks:

Report (First Sit)
Description: Group report (max 2500 words)
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO3, MO4

Examination (First Sit)
Description: Written closed book examination (2 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Report (Resit)
Description: Group report (max 2500 words)

Resit deliverable(s) will be scaled appropriately to group size and task complexity
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3, MO4

Examination (Resit)

Description: Written closed book exam (2 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Aerospace Engineering {Apprenticeship-UCW} [Sep][FT][UCW][5yrs] BEng (Hons) 2021-22

Aerospace Engineering {Apprenticeship-UCW} [UCW] BEng (Hons) 2022-23

Aerospace Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2021-22

Aerospace Engineering [Sep][SW][Frenchay][5yrs] MEng 2021-22

Aerospace Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2021-22

Aerospace Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][5yrs] MEng 2021-22

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][4yrs] BEng (Hons) 2021-22

Aerospace Engineering with Pilot Studies {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2021-22

Aerospace Engineering [Frenchay] BEng (Hons) 2022-23

Aerospace Engineering [Frenchay] MEng 2022-23

Aerospace Engineering with Pilot Studies [Frenchay] MEng 2022-23

Aerospace Engineering with Pilot Studies [Frenchay] BEng (Hons) 2022-23

Aerospace Engineering {Apprenticeship-UWE} [UCW] BEng (Hons) 2022-23