Module Specification

Fundamental Aircraft Structures

Version: 2025-26, v1.0, 29 Jul 2024

Contents

Part 1: Information

Module title: Fundamental Aircraft Structures

Module code: UFMEAM-30-2

Level: Level 5

For implementation from: 2025-26

UWE credit rating: 30

ECTS credit rating: 15

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: Fundamentals of Mechanical Principles 2024-25

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module provides 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.

Features: Not applicable

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

Outline syllabus: The module aims to introduce apprentices to the analysis and idealisation methods of simple aircraft structures. The apprentices will be exposed to a number of aspects.

Elasticity concepts in aircraft structures.
Aircraft Structural Instability.
Bending, Shear and Torsion of thin-walled beams.
Structural Idealisation.
Fatigue of aircraft structures.

Part 3: Teaching and learning methods

Teaching and learning methods: This module uses a blend of traditional lectures to focus and convey concepts on applications of aircraft analysis such as wing boxes, fuselage and dimension components for fatigue life and design plates for buckling analysis for some primary and secondary aircraft components such as wing boxes, wing spars and skin panels.

Finite elements analysis (FEA) is introduced during term 2 as an extension of stress analysis, with an emphasis on practical skills to be able to use industry standards integrated codes and software (such as ANSYS and ABAQUS). The theory underpinning FEA is necessary in order to allow apprentices to appreciate and quantify the approximations and hypotheses the method uses.

The method of teaching and learning is designed so that apprentices can quickly consolidate theoretical principles through class-based exercises by using analytical and numerical methods.

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

MO1 Demonstrate a detail knowledge and understanding of key theoretical principles used on aircraft structures.

MO2 Solve a range of real aircraft structures problems using mathematical and analytical methods.

MO3 Develop and solve simplified numerical methods of structural design for real aircrafts.

MO4 Analyse and reflect when comparing analytical and numerical methods for aircraft structures.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 0

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/F2E7F850-BED4-D44D-DA74-ABE8C8AD8DEA.html?lang=en-GB&login=1

Part 4: Assessment

Assessment strategy: The assessments are designed to allow apprentices to apply industry methods of presenting solutions and research findings in a concise and professional manner.
In Term 1, apprentices design a technical poster individually and are assessed on their understanding of theoretical and analytical methods whilst comparing different methods.
During Term 2 apprentices are paired in small groups to write a scientific report that focuses on the analysis of numerical methods when using industry standard software. Apprentices are also assessed on the collaboration. The assessment will be marked as a group assessment, but the included a peer review will allow individual marks distribution to group members.

The resit assessment will follow the same as the first sit.

Assessment tasks:

Poster (First Sit)
Description: A design process poster of size A1.
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2

Report (First Sit)
Description: A scientific Group Report of length of 2500 words.
Weighting: 50 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO3, MO4

Poster (Resit)
Description: A design process poster of size A1.
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2

Report (Resit)
Description: A scientific Group Report of length of 2500 words.
Weighting: 50 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Aeronautical Engineering {Apprenticeship-UCW}[UCW] BEng (Hons) 2024-25