Module Specification

Aerospace Systems Design

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Part 1: Information

Module title: Aerospace Systems Design

Module code: UFMFSU-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: None

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 first introduction to aerospace systems engineering from a preliminary design standpoint. The content will encompass broad aspects of the modern aerospace vehicle engineering using a systematic model-based approach.

A typical commercial aerospace vehicle contains a series of complex interacting systems in order for it operate safely, reliably and efficiently. These systems involve

the integration of technology from different disciplines such as aerospace, electronic, mechanical engineering and computing. In this module we show how such systems may be designed using a systematic methodological approach taking our examples from real aerospace vehicles.

Throughout the module students will work in design teams towards the documentation and demonstration of a validated design of a typical aerospace systems design problem.

Features: Not applicable

Educational aims: To provide the background necessary to understand multidisciplinary and deeply integrated systems of modern aerospace vehicles and is required for the study of this subject at a higher level in the programme.

Outline syllabus: Outline Syllabus

Model Based Systems Engineering (MBSE)
Iteration based design cycle
Requirements analysis
Conceptual design and Concept of Operation
Systems architecture
Interfaces and systems interactions
Verification and validation
Flight safety and Reliability
Sustainability
Introduction to certification, operation, and maintenance

The module will consider multidisciplinary and intricate systems such as avionics, the aircraft fuel management system, the undercarriage, the platform or the payload.

Part 3: Teaching and learning methods

Teaching and learning methods: The module delivery is design to support students creating valid designs to complex systems problems present in aerospace

vehicles using a systematic model-based approach.

To achieve this objective the design concepts, systems thinking and solution methods will be presented in lectures with real aerospace scenarios to motivate and make clear the connection between theory and practice. The material will then be explored in depth and discussed in small groups in tutorials and practical modelling and simulation labs.

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

MO1 Define appropriate design concepts to capture the requirements and constraints specified in the design of a complex system typical of aerospace vehicles. (D1, D2, D3b, D4, D5, EA4m, EL1m, EL3m, P1, P2m, P8m, P9m, P10m, SM3m)

MO2 Create, analyse and validate an appropriate systems architecture that provides the framework for solution development. (D6, EA2, EA3m, EA4m)

MO3 Develop an appropriate computer-based model of the system architecture. (D4, D5, D6, EA1m, EA2, EA3m)

MO4 Demonstrate and evaluate the performance of the system design against requirements and constraints. (D4, EA1m, EA2, EL2, EL4, G1, G4, P5, P6, P7)

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://rl.talis.com/3/uwe/lists/F2147E41-B9FC-2292-0A13-9C8BFD8DF248.html?lang=en-US&login=1

Part 4: Assessment

Assessment strategy: The assessment strategy is design to allow students to follow the design process as part of a design team working in an aerospace environment.

The computer-based design solution will be developed during the module with the different stages of the methodological approach supported by the weekly delivery of material with students working in groups in tutorial and computer based workshops.

Report:
A 3500 word group report that documents the design solution and process.

Presenation:
Each group will demonstrate their solution and answer individual questions.

The group marks will be moderated using a peer review process as set out in the Departmental Group Work Policy.

The resit assessment will follow 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 on design task (2500)
Weighting: 60 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO4

Presentation (First Sit)

Description: Group demonstration of design solution as a computer simulation model with individual questions (20 minutes total – 8 minute presentation, 12 minutes Q&A)
Weighting: 40 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO2, MO3

Report (Resit)
Description: Group report on design task (2500)

Resit deliverable(s) will be scaled appropriately to group size and task complexity
Weighting: 60 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO1, MO4

Presentation (Resit)
Description: Group demonstration of design solution as a computer simulation model with individual questions (20 minutes total – 8 minute presentation, 12 minutes Q&A)

Resit deliverable(s) will be scaled appropriately to group size and task complexity
Weighting: 40 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO2, MO3

Part 5: Contributes towards

This module contributes towards the following programmes of study:

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

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

Aerospace Engineering [Frenchay] MEng 2022-23

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

Aerospace Engineering {Apprenticeship-UWE} [Sep][FT][UCW][4yrs] BEng (Hons) 2021-22

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

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

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

Aerospace Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2021-22

Aerospace Engineering with Pilot Studies {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2021-22

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