STUDENT AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Information			
Module Title	Digital Manufacturing in Aerospace		
Module Code	UFMF7V-15-3	Level	Level 6
For implementation from	2022-23		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	
Department	FET Dept of Engineering Design & Mathematics		
Module Type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co-requisites	None		
Module Entry Requirements	None		
PSRB Requirements	None		

Part 2: Description

Overview: Digital Manufacturing is a unique attribute of Additive Manufacturing Technologies intertwined with Digital Design Methodologies offering opportunity to design and manufacture of bespoke parts with highly complex features for aerospace and a wide range of other industrial applications.

This module is designed to provide the learners with a detailed knowledge and practical skill for the development of personalised products and customised solutions.

Educational Aims: The aim of this module is to establish the Additive Manufacturing Technologies and Digital Design Methodologies for aerospace applications.

Outline Syllabus: The syllabus aims to provide:

Classification and working principles of each Additive Manufacturing (AM) process

Materials employed in each process

AM standards

Benchmarking methods

Design for AM

Process parameters associated to Powder Bed Fusion and Fused Deposition Modelling

Influence of process parameters on final part properties

Part quality issues associated to material reuse

Multi scale modelling approaches

Benefit of modelling and prediction

Implementation of Direct Digital Modelling process chain

Appreciation of Digitization and data format in Digital

Manufacturing

Understanding design optimisation tools

Various methods available for post processing and finishing

Digitally Manufactured patterns for Investment Casting

Digital tooling enhanced capabilities of Injection Moulding

Development of modular fixturing system

Teaching and Learning Methods: The course will be delivered through a combination of scheduled learning activities, such as lectures and tutorials. These sessions will be used to introduce the principles of the topics and the tutorials and course work assignment will be used to further develop these topics and student competence.

Part 3: Assessment

The assessment model for this module is structured to verify students' competence and demonstrate understanding of digital manufacturing technologies. It also requires students to demonstrate an ability to apply this in a realistic and representative scenario.

The nature of the course work and the requirements for the students to demonstrate competence means that a group based task will be set assessed by a group presentation with individual questions.

The aim of this assignment focuses on the geometric performance evaluation methods used in Additive Manufacturing, particularly focusing on Fused Deposition Modelling (FDM). The knowledge gained from this assignment will enable students to evaluate process performance characteristics including dimensional/geometric accuracy, repeatability, minimum feature size, warpage and distortion, surface roughness, anisotropic mechanical properties and overhang limitations.

A peer review process will be applied to moderate the group mark according to the Department Group Work Policy.

The resit assessment will be an individual presentation based on an appropriately reduced scale of task.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Presentation - Component A	✓	100 %	Group presentation and individual questions (30 minutes)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Presentation - Component A		100 %	Individual presentation (15 minutes)

Part 4: Teaching and Learning Methods

Learning Outcomes

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

Module Learning Outcomes	Reference
Critically evaluate manufacturing technologies, processes and performance for use within aerospace and other industrial sectors (EA2, EA5m, D2, D4, P9m)	MO1
Appropriately apply benchmarking techniques associated to design for manufacture. (SM2m, D5, P2, P8m, P10m)	MO2
Critically evaluate design optimisation tools and approaches in developing complex and functional components. (EA3b, D3b, P3)	MO3
Identify and apply suitable process modelling strategies concerning process efficiency and part quality . (EA1b, D5, G4)	MO4

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Computer-based activities	6
Fieldwork exercise	6
Lectures	12
Tutorials	6
Workshops	6
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://rl.talis.com/3/uwe/lists/7A12AD99-ABAC-35F4-E2EC-42EA90AC0F72.html?lang=en-US&login=1

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

Aerospace Engineering [Sep][FT][Frenchay][4yrs] MEng 2020-21

Aerospace Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][4yrs] MEng 2020-21