STUDENT AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Information			
Module Title	Space Engineering		
Module Code	UFMF8V-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: The module provides a first introduction to space mission engineering from a preliminary design viewpoint. The content will encompass the broad outcomes and performance aspects of modern space missions.

A space mission is characterised by an orderly collection of mission objectives, requirements, spacecraft, orbit, space environment, launch vehicle, and ground operations. The spacecraft is expected to fulfill mission needs for several years while exposed to the harsh operating conditions. The space operation incurs high cost and significant safety risk. Understanding the interaction of contravening mission elements is central to mission planning and success.

In this module, we present how a typical space mission is engineered and analysed.

Educational Aims: Extend the context of the aerospace discipline to the requirements of the space sector. Acquire the knowledge and understanding of scientific principles and methods essential to underpin the skills necessary to analyse and design space missions. The module is encouraged by the Royal Aeronautical Society.

Outline Syllabus: Introduction to astronautics and astrodynamics.

Space commercialisation, space travel, modern missions and satellite applications.

Iteration based space mission lifecycle engineering.

Orbital mechanics.

Orbit correction, perturbations and elementary manoeuvring.

Coverage analysis, constraints and trade studies.

Launch analysis.

Space environment interactions.

Mission assurance.

Teaching and Learning Methods: The module delivery is designed to support students engineer innovative space missions.

The elements of space mission engineering and design methods will be presented in lectures. To motivate and make clear the connection between theory and practice, the students will apply design and simulation techniques on real mission scenarios. The material will then be explored in-depth and discussed in small groups in tutorials to develop a full-scale mission which will be analysed for technical feasibility at the preliminary design level.

Part 3: Assessment

The assessment strategy is designed to allow students to follow the standard mission design process as part of a space team.

The computer-based mission will be developed during the module with a methodological approach supported by the weekly delivery of material. The students will work in groups in the tutorial and simulation-based workshops to progressively develop the mission.

Component A will be a controlled condition 2-hour examination to assess specific and independent learning.

Component B assesses a broader understanding of space mission engineering in a team setting. A 3500-word group report that documents the mission design will be required along with the project archive of mission design.

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 format as above but with Component B consisting of an individual report (1500 words).

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A	✓	50 %	Written exam (2 hours)
Report - Component B		50 %	Group report (3500 words)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Examination - Component A		50 %	Written exam (2 hours)
Report - Component B		50 %	Individual report (1500 words)

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
Implement an effective analysis on a broad mission and system requirements for conceiving and developing a space mission (D1, D2, D3b, D4, D5, D6, EA2)	MO1
Determine the desired mission orbit and dynamics through the application of Newton's theories, laws of conservation and computation of Kepler's elements. (EA3m)	MO2
Analyse environmental loading and examine the load effects on the mission performance and life (EA3m, SM1b, SM2b, SM3b)	MO3
Verify and validate (V&V) the mission on the merits of technical complexity, performance trade-off, reliability and cost and make improvements applying engineering design cycle principles (EA2, EA4m)	MO4

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
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/155A37CF-AB3D-B42E-80F0-868A2E9F33C1.html?lang=en-GB&login=1

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

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

Aerospace Engineering [Sep][FT][Frenchay][4yrs] MEng 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