Module Specification

Spaceflight

Version: 2025-26, v3.0, Approved

Contents

Part 1: Information

Module title: Spaceflight

Module code: UFMFCH-15-3

Level: Level 6

For implementation from: 2025-26

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: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: The module covers theoretical and practical aspects of spaceflight propulsion, vehicle design and operation. Students will study the different types of propulsion to and in-space including aerodynamic, structural and thermal aspects.

Features: Not applicable

Educational aims: The aim of this module is to provide knowledge and understanding on the propulsive design and subsequent performance of

transatmospheric and space vehicles. The module brings together, scientific, engineering design and mathematical concepts covered at an earlier stage in the programme but now applied to the space and near-space environment.

Outline syllabus: This module will cover:
- Propulsion technology for transatmopspheric travel and in space.
- Rocket design (staging, nozzles),
- Planetary flightpaths: launch, re-entry and landing;
- theoretical and numerical modelling techniques for hypersonic aerothermodynamics,
- space structures
- atmospheric drag effects on vehicles and orbits
- Supersonic flow theory including use of the supersonic windtunnel for external aerodynamics.

Part 3: Teaching and learning methods

Teaching and learning methods: The module delivery is designed to support students decide on suitable propulsion technologies to take a vehicle into space, and then
produce useful predictions on the vehicle behaviour in-flight whilst undertaking its mission.

To achieve this objective the methods presented in lectures will inform and make clear the connection between theory and practice. The material will be discussed and practised in tutorial sessions and simulation labs.

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

MO1 Describe, validate and explain in detail, the principles and relevant theory for design and operation of spacecraft and launch vehicles in space and in planetary atmospheres (SM1b, SM2, D3b, EA1b, EA2, EA3, EL1, EL4)

MO2 Compare and evaluate different propulsion systems, selecting appropriate systems for different scenarios (SM1b, SM2, D3b, EA1b, EA2, EA3, P8)

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufmfch-15-3.html

Part 4: Assessment

Assessment strategy: This module has one assessment only. The assessment task is a two hour exam viva where students are questioned on their technical knowledge of space propulsion and on solving theoretical problems for design space propulsion vehicles and space structures.
Resit is the same as the first sit.

Assessment tasks:

Examination (First Sit)
Description: A closed book exam on the methods and calculation procedures taught in the course. (2 hours)
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2

Examination (Resit)
Description: A closed book exam on the methods and calculation procedures taught in the course. (2 hours)
Weighting: 100 %

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 with Pilot Studies [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering with Pilot Studies [Frenchay] MEng 2023-24

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

Aerospace Engineering [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering [Frenchay] MEng 2023-24

Aerospace Engineering [Frenchay] MEng 2023-24

Aerospace Engineering [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering with Pilot Studies [Frenchay] BEng (Hons) 2023-24

Aerospace Engineering with Pilot Studies [Frenchay] MEng 2023-24

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

Aerospace Engineering with Pilot Studies [Frenchay] MEng 2023-24

Aerospace Engineering [Frenchay] MEng 2022-23

Aerospace Engineering [Frenchay] MEng 2023-24

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

Aerospace Engineering [Frenchay] MEng 2022-23

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

Aerospace Engineering [Sep][PT][Frenchay][8yrs] - Withdrawn MEng 2020-21

Aerospace Engineering (Systems) [Sep][PT][Frenchay][8yrs] - Withdrawn MEng 2020-21

Aerospace Engineering (Design) [Sep][PT][Frenchay][8yrs] - Withdrawn MEng 2020-21

Aerospace Engineering with Pilot Studies (Design) [Sep][PT][Frenchay][6yrs] - Withdrawn BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Systems) [Sep][PT][Frenchay][6yrs] - Withdrawn BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][PT][Frenchay][6yrs] - Withdrawn BEng (Hons) 2020-21

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

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

Aerospace Engineering [Frenchay] MEng 2022-23

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

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

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