



Module Specification

Spaceflight

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Part 1: Information

Module title: Spaceflight

Module code: UFMFCH-15-3

Level: Level 6

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 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 and explain in detail, design principles and theory for spacecraft and launch vehicles (SM1b, EA1b, EL1)

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

MO3 Apply a range of appropriate simulation tools for mission and vehicle design from concept to operation (SM2b, EA3, P8)

MO4 Validate and analyse designs created in the operating space environment and in planetary atmospheres. (EA2, D3b, EL4)

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](https://uwe.rl.talis.com/modules/ufmfch-15-3.html) via the following link <https://uwe.rl.talis.com/modules/ufmfch-15-3.html>

Part 4: Assessment

Assessment strategy: The assessment for this module is as follows:

A is 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.

A group report on space vehicle design. This report allows the students to demonstrate their successful application of the principles and methods provided in the module, and it enables them to present their worked solution to the given problem. Group work marks will be moderated using the peer assessment strategy set out in the EDM Group Work Policy

Resit is 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 is up to 6000 words with an additional 500 words from each student on their reflection and individual understanding of the process.

Weighting: 50 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (First Sit)

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

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Report (Resit)

Description: Group report is up to 6000 words with an additional 500 words from each student on their reflection and individual understanding of the process.

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Weighting: 50 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (Resit)

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

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Aerospace Engineering [Sep][FT][Frenchay][3yrs] BEng (Hons) 2021-22

Aerospace Engineering [Sep][FT][Frenchay][4yrs] MEng 2021-22

Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][4yrs] MEng 2021-22

Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][3yrs] BEng (Hons)
2021-22

Aerospace Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2020-21

Aerospace Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Aerospace Engineering {Foundation} [Sep][FT][Frenchay][4yrs] BEng (Hons) 2020-
21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][4yrs] BEng (Hons)
2020-21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][5yrs] MEng 2020-21

Aerospace Engineering with Pilot Studies {Foundation} [Sep][FT][Frenchay][4yrs]
BEng (Hons) 2020-21

Aerospace Engineering [Sep][SW][Frenchay][5yrs] MEng 2020-21

Aerospace Engineering (Design) [Sep][SW][Frenchay][5yrs] - Not Running MEng
2020-21

Aerospace Engineering [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons)
2020-21

Aerospace Engineering (Design) [Sep][SW][Frenchay][4yrs] - Not Running BEng
(Hons) 2020-21

Aerospace Engineering (Systems) [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering (Systems) {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering (Design) {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Systems) [Sep][SW][Frenchay][5yrs] - Not Running MEng 2020-21

Aerospace Engineering with Pilot Studies (Design) [Sep][SW][Frenchay][5yrs] - Not Running MEng 2020-21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Systems) [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Design) [Sep][SW][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Systems) {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies (Design) {Foundation} [Sep][FT][Frenchay][4yrs] - Not Running BEng (Hons) 2020-21

Aerospace Engineering with Pilot Studies [Sep][SW][Frenchay][5yrs] MEng 2020-21

Aerospace Engineering (Systems) [Sep][SW][Frenchay][5yrs] MEng 2020-21

Aerospace Engineering with Pilot Studies {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Aerospace Engineering with Pilot Studies (Design) {Foundation}

[Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Aerospace Engineering with Pilot Studies (Systems) {Foundation}

[Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Aerospace Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Aerospace Engineering (Design) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Aerospace Engineering (Systems) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2019-20

Aerospace Engineering with Pilot Studies (Systems) [Sep][PT][Frenchay][6yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies (Design) [Sep][PT][Frenchay][6yrs] BEng (Hons) 2018-19

Aerospace Engineering with Pilot Studies [Sep][PT][Frenchay][6yrs] BEng (Hons) 2018-19

Aerospace Engineering [Sep][PT][Frenchay][8yrs] MEng 2018-19

Aerospace Engineering (Design) [Sep][PT][Frenchay][8yrs] MEng 2018-19

Aerospace Engineering (Systems) [Sep][PT][Frenchay][8yrs] MEng 2018-19