



Module Specification

Aero-Propulsion

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Part 1: Information

Module title: Aero-Propulsion

Module code: UFMFW6-15-3

Level: Level 6

For implementation from: 2023-24

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: Fluid Dynamics 2023-24

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: The course aims to provide a basic education in propulsion across all aspects of aerospace.

Features: Not applicable

Educational aims: See Learning Outcomes.

Outline syllabus: Linear Momentum Equation and Hydrodynamics Forces.

Engineering Applications: Force required to restrain a Convergent Nozzle, Rocket

Engine Thrust, Turbojet Engine Thrust, Flow Through a Sudden Enlargement, Jet Pump/Ejector/Injector, Turbofan-Engine Thrust, Reaction Force on a Pipe Bend, Reaction Force on a Pipe Junction, Flow Through a Cascade of Guidevanes, Jet Impinging on a Flat Plate.

The working of the gas turbine engine and engine power plants.

Turbojet/Turbofan, technical description and development.

Shaft Power Cycles.

Turbojet/Turbofan – Performance, losses.

Heat Transfer and Cooling Blade Cooling Performance.

Combustion, fuel and combustion chemistry; fuel-air mixtures; engine limits

Compressible duct flow: speed of sound; isentropic flow; effects of area change at sub-, trans- and supersonic Mach numbers; convergent-divergent ducts; nozzle expansion ratios; intake mass flow requirements.

Space propulsion engines including rockets, heat exchangers, ramjets and scramjets.

Introduction to Helicopters.

Applicable regulations for certification and flight including FAA, JAR, CAA, and ATA.

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled learning includes lectures, computer tutorials using industry standard software, worked tutorial sessions, demonstration, practical classes and workshop activities.

Independent learning includes hours engaged with essential reading, preparation, assignment preparation and completion.

Contact: 54 hours

Assimilation and skill development: 26 hours

Coursework: 50 hours

Exam preparation: 20 hours

Total: 150 hours

Contact hours include workshop time under technician supervision.

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

MO1 Show a detailed knowledge of the assessment and modelling of a propulsion system or flow situation

MO2 Understand the nature of the thermodynamic and chemical changes undergone by a fluid in each process making up a thermodynamic cycle

MO3 Calculate the changes in fluid properties at specific points around a thermodynamic cycle and, from these, estimate engine performance

MO4 Estimate the airscrew performance and output from basic flow measurements and aerofoil data

MO5 Understand and interpret the forms of engine documentation and related data presentation methods

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 96 hours

Face-to-face learning = 54 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/ufmfw6-15-3.html) via the following link <https://uwe.rl.talis.com/modules/ufmfw6-15-3.html>

Part 4: Assessment

Assessment strategy: The assessment strategy is as follows:

An end of module exam.

An assessment of modelling an engine through the various stages of its operation along with basic combustion modelling experience. This will be through numerical simulation supported by experimental results and assessed via a group presentation.

The first sit and resit are the same.

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

Assessment tasks:

Examination (First Sit)

Description: On-Campus Examination (2 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Presentation (First Sit)

Description: Project/case study (group presentation)

Weighting: 50 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3

Examination (Resit)

Description: Examination (2 hours)

Weighting: 50 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4, MO5

Presentation (Resit)

Description: Project/case study (individual presentation)

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

Part 5: Contributes towards

This module contributes towards the following programmes of study:

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

Aerospace Engineering (Manufacturing) [Sep][SW][Frenchay][5yrs] - Not Running
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 (Manufacturing) [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 (Manufacturing) {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 (Manufacturing) {Apprenticeship-UWE} [Sep][FT][UCW][4yrs] - Not Running BEng (Hons) 2020-21

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

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

Aerospace Engineering [Sep][PT][Frenchay][8yrs] MEng 2019-20

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

Aerospace Engineering with Pilot Studies (Design) [Sep][PT][Frenchay][6yrs] BEng
(Hons) 2019-20

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

Aerospace Engineering with Pilot Studies [Sep][PT][Frenchay][6yrs] BEng (Hons)
2019-20

Aerospace Engineering with Pilot Studies (Manufacturing) [Sep][PT][Frenchay][6yrs]
BEng (Hons) 2019-20

Aerospace Engineering with Pilot Studies (Systems) [Sep][PT][Frenchay][6yrs] BEng
(Hons) 2019-20

Aerospace Engineering with Pilot Studies (Manufacturing) {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 (Design) [Sep][PT][Frenchay][8yrs] MEng 2019-20

Aerospace Engineering (Manufacturing) [Sep][PT][Frenchay][8yrs] MEng 2019-20

Aerospace Engineering (Systems) [Sep][PT][Frenchay][8yrs] MEng 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 (Manufacturing) {Foundation} [Sep][SW][Frenchay][5yrs]
BEng (Hons) 2019-20

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

Aerospace Engineering (Manufacturing) {Apprenticeship-UCW}
[Sep][FT][UCW][5yrs] BEng (Hons) 2019-20