MODULE SPECIFICATION

Part 1: Information			
Module Title	Aerodynamics and Flight		
Module Code	UFMFY6-30-2	Level	Level 5
For implementation from	2019-20		
UWE Credit Rating	30	ECTS Credit Rating	15
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	Engineering Mathematics 2019-20		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: This module covers theoretical and practical aspects of aerodynamics, performance, static stability and orbital mechanics.

Educational Aims: See Learning Outcomes

Outline Syllabus: This module will cover:

Elements of Aeroplane Performance: Equations of Motion, Thrust and Power required for Level, Unaccelerated Flight, Thrust and Power available and maximum velocity, Altitude Effect on Power required and available, Rate of Climb, Gliding Flight, Time to Climb, Range and Endurance - Breguet Equation, Takeoff and Landing Performances.

Principles of Stability and Control: Static Stability, Dynamic Stability.

Static Stability: Longitudinal Stability, Neutral Point, Static Margin, Calculation of Elevator Angle to Trim, Stick-fixed versus Stick-free Static stability, Elevator Hinge Moment, Lateral Stability.

Subsonic Flow over Aerofoils and wings: flow field characteristics; influential flow field and shape parameters; stall and separation; boundary layer flows.

Potential theory, 2D aerofoil and 3D wing theory including vortex systems.

Transonic and Supersonic Flows over aerofoils: compressible flows, shock waves.

High lift profiles and devices, effects of leading and trailing edges.

Introduction to computational fluid dynamics (CFD): relevant equations, principles of discretisation, turbulence models, mesh generation, boundary conditions, accuracy and convergence, post-processing, validation and assessment of results.

Teaching and Learning Methods: See Assessment

Part 3: Assessment

Component A, a two hour exam on aerodynamics to test student understanding of theoretical knowledge and calculation skills in controlled conditions.

Component B contains an assessment portfolio demonstrating key skills. It reinforces theory by giving students practical experience in applying the theoretical principles in a real context. It includes:

Aerodynamics assignment including computational fluid dynamics (CFD), and physical testing of flows,

Performance, stability assignment,

Basic spacecraft trajectories and manoeuvres.

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Portfolio - Component B		75 %	Portfolio
Examination - Component A	✓	25 %	Examination (2 hrs)
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Portfolio - Component B		75 %	Portfolio
Examination - Component A	✓	25 %	Examination (2 hrs)

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**
Use aerodynamic theory for describing subsonic, transonic and supersonic flows.	MO1
Acquire basic knowledge in flight theory for performance, stability and design of aircraft and spacecraft.	MO2
Use of numerical models to produce simulations of aerodynamic flows for basic geometries in different flow regimes.	MO3
Demonstrate key transferable skills in problem formulation and decision making, self-management and communication.	MO4
Demonstrate an awareness of, and access to professional literature.	MO5

Contact Hours	**Independent Study Hours:**	
	Independent study/self-guided study	228
	Total Independent Study Hours:	228
	Scheduled Learning and Teaching Hours:	
	Face-to-face learning	72
	Total Scheduled Learning and Teaching Hours:	72
	Hours to be allocated	300
	Allocated Hours	300
Reading List	*The reading list for this module can be accessed via the following link:* https://uwe.rl.talis.com/modules/ufmfy6-30-2.html	

Part 5: Contributes Towards

This module contributes towards the following programmes of study:

Aerospace Engineering [Sep][SW][Frenchay][5yrs] MEng 2018-19

Aerospace Engineering (Design) [Sep][SW][Frenchay][5yrs] MEng 2018-19

Aerospace Engineering (Manufacturing) [Sep][FT][Frenchay][4yrs] MEng 2018-19

Aerospace Engineering (Manufacturing) [Sep][SW][Frenchay][5yrs] MEng 2018-19

Aerospace Engineering (Systems) [Sep][SW][Frenchay][5yrs] MEng 2018-19

Aerospace Engineering [Sep][SW][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Design) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2018-19

Aerospace Engineering (Design) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Manufacturing) [Sep][FT][Frenchay][3yrs] BEng (Hons) 2018-19

Aerospace Engineering (Manufacturing) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Systems) [Sep][SW][Frenchay][4yrs] BEng (Hons) 2018-19

Aerospace Engineering (Design) [Sep][FT][Frenchay][4yrs] MEng 2018-19

Aerospace Engineering (Systems) {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19

Aerospace Engineering {Foundation} [Sep][SW][Frenchay][5yrs] BEng (Hons) 2018-19