UNIVERSITY of BRADFORD

Module Descriptor

Advanced Fluid Mechanics with Aerodynamics

Module Code:	MAE6013-B
Academic Year:	2018-19
Credit Rating:	20
School:	Department of Mechanical and Energy Systems Engineering
Subject Area:	Mechanical and Automotive Engineering
FHEQ Level:	FHEQ Level 6
Module Leader:	Professor Tim Gough

Additional Tutors:

Pre-requisites:

Co-requisites:

Contact Hours

Type	Hours
Lectures	48
Tutorials	24
Laboratory	6
Directed Study	118
Examinations DO NOT USE	4

Availability Periods

Occurrence	Location/Period
BDA	University of Bradford / Academic Year (Sept - May)

Module Aims

To examine the principles of fluid flow relevant to a wide range of industries. To qualify and quantify the effects of these internal and external flows upon the flight of airplanes, the performance of ground vehicles and industrially engineering machinery.

Outline Syllabus

Fluid properties and flow properties - static and dynamic pressure,
Types of fluid flow - laminar, transitional and turbulent, viscous and inviscid
Mass continuity, energy equations, momentum (Euler and Navier-Stokes) equations and their applications
Shear bounded flows - the boundary layer, pipe flows
Free shear flows - jets, wakes, mixing layers
External and internal incompressible and compressible flows
Aerodynamic forces - lift, drag - pressure, skin friction, induced drag
Aerodynamic axis systems and moments
Attached and separated flow, pressure coefficients, angle of attack
Ground vehicle aerodynamics: ground effects; under body channels; diffusers; spoilers; other typical examples of aerodynamics from real life case studies
Propulsion systems - propellors, turbojets, turbofans, ram and scramjets
Machines for renewable energy - wind turbines, wave machines and tidal power

Module Learning Outcomes

On successful completion of this module, students will be able to...

1 Understand the application of theories of Newtonian fluid mechanics; both viscous and inviscid, and incompressible and compressible, to real world applications in the aeronautics, automotive and other industries.

2 Quantify fluid dynamical forces and understand their influence on performance within a wide range of industrial applications.

3 Interpret and justify laboratory experimental data by using available information and propose solutions to problems arising from that analysis.

Learning, Teaching and Assessment Strategy

Theoretical understanding and problem solving through lectures, staff-led tutorial/example classes, laboratory experiments and directed study, practical skills of data interpretation and justification gained from lab sessions, assessed by examination.

Mode of Assessment

Type	Method	Description	Length	Weighting	Final Assess'
Summative	Examination - closed book	four compulsory exam questions and one question based on laboratory activities	2 hours	100%	Yes

Legacy Code (if applicable)

ENG3305L

Reading List

To view Reading List, please go to **rebus:list**.