Module Specification

Aerodynamics C

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Part 1: Information

Module title: Aerodynamics C

Module code: UFMEWA-15-M

Level: Level 7

For implementation from: 2021-22

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Delivery locations: Frenchay Campus

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Module Entry requirements, the module is intended for science and engineering graduates, or equivalent, with strong mathematical skills.

Features: Not applicable

Educational aims: See learning outcomes.

Outline syllabus: Unsteady Aerodynamics:

Review of the basic laws, Theodorsen equation, panel methods

Oscillating airfoils in incompressible, subsonic, and supersonic flows

Arbitrary airfoil motion, oscillating finite wings

Unsteady motion of finite wings

Unsteady motion of non-lifting bodies

Unsteady boundary layer flow in two-dimensional and asymmetric flows

Periodic boundary layer flows

Unsteady separation

Oscillating flow in a pipe

Unsteady compressible boundary layers

Aero-elastic buffet

Stall flutter

Part 3: Teaching and learning methods

Teaching and learning methods: Students will learn through a combination of formal lectures and tutorial sessions.

Module Learning outcomes:

MO1 The key principles of unsteady aerodynamics

MO2 The differences between buffet and stall flutter

MO3 The numerical methods used for unsteady aerodynamics

MO4 Unsteady motion on wings and no-lifting bodies

MO5 The physics of unsteady aerodynamics (subsonic/transonic and supersonic flows) and numerical methods, such as panel methods and Theodorsen equation

MO6 Applications of theoretical predictions to wings

MO7 The numerical/experimental data from a wing

MO8 The unsteady phenomena caused by the interaction between the shock on the upper surface and the separation characterized by a main frequency corresponding to the shock movement and the pulsation of the separation

MO9 Panel methods for analysis of lift generation and oscillating airfoils

MO10 The boundary-layer viscous – inviscid interaction

MO11 The Theordorsen function, which is essentially a Fourier Transform of the Wagner Function, and understand its limitations

MO12 Relevant professional literature

MO13 Problem formulation and decision making

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 via the following link https://uwe.rl.talis.com/modules/ufmewa-15-m.html

Part 4: Assessment

Assessment strategy: The module is examined via an open book exam.

Assessment components:

Examination (Online) - Component A (First Sit)
Description: Online examination
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO10, MO11, MO12, MO13, MO2, MO3, MO4, MO5, MO6, MO7, MO8, MO9

Examination (Online) - Component A (Resit)
Description: Online examination
Weighting: 100 %
Final assessment: Yes
Group work: No
Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

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

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

Aerospace Engineering with Pilot Studies [Sep][FT][Frenchay][4yrs] MEng 2018-19

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