Course unit title:	Aerodynamics
Course unit code:	ME 401
Type of course unit:	Technical Elective
Level of course unit:	Bachelor (1st Cycle)
Year of study:	4
Semester when the unit is delivered:	7 (Fall)
Number of ECTS credits allocated :	6
Name of lecturer(s):	Dr. Marios M. Fyrillas
Learning outcomes of the course unit:	1. Use of flow similarity and non-dimensional coefficients in aerodynamic modelling 2. Explain the nature of drag, lift, side-force and their relation to the pressure and shear stress distribution 3. Use of potential flow solutions and superposition to evaluate lift and drag force on a body and determine the pressure distribution. 4. Evaluate the effects of viscosity and turbulence on the drag force using boundary layer analysis. 5. Develop the appropriate equations and evaluate the properties of an ideal gas undergoing isentropic and non-isentropic compressible flow.
Mode of delivery:	Face-to-face
Prerequisites:	AMEE 202, AMEE 200 — Co-requisites:
Recommended optional program components:	None
Course contents:	• Review: Hydrostatics, Control Volume, Mass/Momentum/Energy Conservation, Navier-Stokes equations. • Dimensional Analysis: Use of flow similarity and non-dimensional coefficients in aerodynamic modelling; Mach number, Reynolds number, Froyde Number. • Forces acting on an immersed body: Explain the nature of drag, lift, side-force • Viscous flow: Effects of viscosity and turbulence on the drag and lift force, boundary layer analysis. • Compressible flow - Ideal gas properties - Isentropic flow of an ideal gas • Nonisentropic flow of an ideal gas: duct flow with friction, duct flow with heat transfer
Recommended and/or required reading:	
Textbooks:	• Donald F. Young, Theodore H. Okiishi, Bruce Roy Munson, ***Fundamentals of Fluid Mechanics***, John Wiley & Sons, 4th edition, 2002 • John D. Anderson, ***Fundamentals of Aerodynamics***, McGraw-Hill Education, 2001
References:	• John J. Bertin, ***Aerodynamics for Engineers***, 4th edition, Prentice Hall, 2001 • J. A. D. Ackroyd, B. P. Axcell, A. I. Ruban, ***Early Development of Modern Aerodynamics***, American Institute of Aeronautics and Astronautics, 2001 • Joseph Katz, Allen Plotkin, ***Low-Speed Aerodynamics***, Cambridge University Press, 2001
Planned learning activities and teaching methods:	The taught part of course is delivered to the students by means of lectures, conducted with the help of both computer presentations and traditional means. Practical examples and exercises are included in the lectures to enhance the material learning process. Lecture notes and presentations are available through

	the web for students to use in combination with the textbooks. Students are assessed continuously and their knowledge is checked through tests with their assessment weight.
Assessment methods and criteria:	• Assignments 15% • Tests: 25% • Final Exam 60%
Language of instruction:	English
Work placement(s):	No