a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM109E01	*Semester*	9
Course title	**Aerodynamics**		
Independent teaching activities		*Weekly teaching hours*	*ECTS*
Lectures		3	4.5
Laboratory exercises		1	
Course type		Knowledge deepening/consolidation	
Course category		Compulsory Elective for Direction 1	
Prerequisite courses		-	
Language of instruction and examinations		Greek	
Is the course offered to Erasmus students		Yes	
Course website (url)		https://eclass.uniwa.gr	

b) Learning outcomes and general competences

b1. Learning outcomes

Upon successful completion of this course, the student will be able to:

- Understand low speed aerodynamics to solve fundamental and practical problems.
- Describe the fundamental aerodynamic and geometrical properties related to external flows over airfoils, wings, and bluff bodies
- Calculate the aerodynamic forces and moments experienced by airfoils, wings and bluff bodies
- Determine when to apply basic aerodynamic equations (such as Bernoulli's equation, Laplace's equation, etc.) to solve problems.
- Develop a working knowledge of experimental test facilities, techniques and equipment commonly used in the fields of experimental aerodynamics, as well as, of relevant computer simulation software.
- Present data in an appropriate manner through the use of tables and graphs, compare experimental data to theoretical and numerical predictions, and communicate effectively in written form the results of an engineering experiment.

b2. General competences

- Search for, analysis and synthesis of data and information with the use of the necessary technology
- Production of free, creative and inductive thinking
- Working independently
- Team work

c) Syllabus

This course is focused on incompressible aerodynamics and its applications:

Theory: Introductory Concepts, Fundamental Principles and Equations. Basic Principles of inviscid incompressible flows. Elements from the aerodynamics of an airplane (Incompressible flows over airfoils and finite span wings, Aerodynamic forces and moments) Introduction to boundary layers. Experimental Aerodynamics (Wind Tunnel Testing, Measurement Instrumentation, Scaling Effects, Wall Interference). Elements of vehicle aerodynamics, building aerodynamic, wind energy-wind turbines. aerodynamically induced oscillations.

Laboratory: Conducting laboratory exercises to reinforce the concepts of theory and gain practical experience by performing experiments in wind tunnels using state of the art experimental techniques (thermal anemometry, Particle Image Velocimetry (PIV), etc.) and running relevant computer simulations using open access software.

d) Teaching and learning methods - Evaluation

Delivery	Face-to-face, Distance learning.	
Use of information and communications technology	- Commercial/free/open source software - Multimedia applications - MS Teams/eclass	
Teaching methods	*Activity*	*Semester workload*
	Lectures	39
	Tutorials	0
	Laboratory exercises	13
	Computational exercises	0
	Individual work	78
	Course total	130
Student performance evaluation	Theory: Intermediate assessment and written final examination. Laboratory: Individual and/or group assignments and written or oral examination or presentation, per exercise and per case of study	

e) Suggested bibliography

1. Anderson, J.D. (2011). *Fundamentals of Aerodynamics*. (5th Ed.) McGraw-Hill. Μετάφραση Τερτίπη, Δ.Ν. και επιμ. Υάκινθου, Κ. (2017). *Βασικές Αρχές Αεροδυναμικής*. Εκδόσεις Τζιόλα.
2. Bertin, J.J. and Smith, M.L. (2013). *Aerodynamics for Engineers*, (6th Ed.) International Edition Pearson.
3. Shevell, R. (1989). *Fundamentals of Flight*. (2nd Ed.) Prentice Hall, 1989.
4. Barlow, J.B., Rae, W.H. Jr. and Pope, A. (1999). *Low-Speed Wind Tunnel Testing*, (3rd Ed.) Wiley.
5. Goldstein, R.J. (Ed.). (1983). Fluid Mechanics Measurement (2nd Ed.) Hemisphere.
6. Blevins, R.D. (2001). Flow Induced Vibrations. (2nd Ed.) Krieger Pub Co.
7. Hansen, M.O.L. (2015). Aerodynamics of Wind Turbines, (3rd Ed.) Routledge.
8. Hucho, W.H. (ed.). (1998). *Aerodynamics of Road Vehicles: from fluid mechanics to vehicle engineering*, (4th Ed.) SAE International.
9. Lawson, T., (2001). *Building Aerodynamics*. Imperial College Press.
10. Teaching notes in Greek, based on the above mention English textbooks.