a) General			
School	ENGINEERING		
Academic unit	MECHANICAL ENGINEERING		
Level of studies	Undergraduate		
Course code	MM005Y04	*Semester*	5
Course title	**Fluid flow machines**		

Independent teaching activities	*Weekly teaching hours*	*ECTS*
Lectures	4	6
Laboratory exercises	1	

Course type	Special background
Course category	Compulsory
Prerequisite courses	-
Language of instruction and examinations	Greek
Is the course offered to Erasmus students	Yes
Course website (url)	https://eclass.uniwa.gr/courses/MECH108/ https://eclass.uniwa.gr/courses/MECH121/ (Erasmus students)

b) Learning outcomes and general competences

b1. Learning outcomes

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

- Describes and analyzes the flow inside a fluid flow machine,
- Solves pipe network problems and selects the type and size of the pumps or pumps, ,
- Designs a pumping station and performs life cycle cost analysis of pump or pumps,
- Implements the preliminary design of a pump or fan utilizing computational and cad tools,
- Conducts measurements in pump, fan/blower and water turbine test rigs and submits a technical report on them.

b2. General competences

- Search for analysis and synthesis of data and information with the use of the necessary technology
- Working independently
- Team work
- Working in an international environment

c) Syllabus

Introduction (Classification and application of fluid flow machines, absolute and relative motion, Euler's turbomachine equation, types of impellers, dimensionless quantities and similitude laws in turbomachines, cavitation, water hammer). Rotodynamic pumps (Performance curves, similarity laws, operating point of the system "pump / network", pumps operation in parallel and series, λειτουργία αντλιών σε συνεργασία, pump installation analysis and design, selection of pump, operation and control of pumping unit, pump life cycle cost, radial flow pump design). Water turbines (Types, principle of operation and performances, design elements and sizing, selection criteria, hydropower plants and reversible pump-turbine). Fan-Blowers-Compressors (Types, operation, performances, applications). Laboratory exercises and case studies.

d) Teaching and learning methods - Evaluation

Delivery	Face-to-face, Distance learning

<table>
<tr><td>Use of information and communications technology</td><td colspan="2">- Commercial/free/open source software
- Multimedia applications
- MS Teams and eclass
- Open courses</td></tr>
<tr><td rowspan="7">Teaching methods</td><td>Activity</td><td>Semester workload</td></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Tutorials</td><td>10</td></tr>
<tr><td>Laboratory exercises</td><td>5</td></tr>
<tr><td>Computational exercises</td><td>11</td></tr>
<tr><td>Individual work</td><td>91</td></tr>
<tr><td>Course total</td><td>156</td></tr>
<tr><td>Student performance evaluation</td><td colspan="2">Intermediate assessment (individual and / or group work and / or written examination) and written final examination.
For the laboratory exercises: Individual and / or group assignments and written or oral examination or presentation, per exercise and per case of study.</td></tr>
<tr><td colspan="3">e) Suggested bibliography</td></tr>
<tr><td colspan="3">
Παπανίκας, Δ.Γ. (2012). Ρευστοδυναμικές Μηχανές. Εκδότης Media Guru.
Παπαντώνης, Δ.Ε. (2016). Υδροδυναμικές Μηχανές: Αντλίες - Υδροστρόβιλοι - Υδροδυναμικές Μεταδόσεις. Εκδόσεις Τσότρας.
Lobanoff, V.S. and Ross, R.R. (2005). Centrifugal Pumps: Designs and Application. Jaico Publ. House.
Round, G.F. (2004). Incompressible Flow Turbomachines: Design, Selection, Applications, and Theory. Butterworth-Heinemann.
Wright, T. and Gerhart, P. (2009). Fluid Machinery: Application, Selection, and Design. CRC Press.
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