



Subject card

Subject name and code	Fluid Mechanics, PG_00049759						
Field of study	Power Engineering, Power Engineering						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2024/2025		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			English		
Semester of study	4	ECTS credits			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Hydromechanics and Hydroacoustics -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Krężelewski					
	Teachers	dr inż. Michał Krężelewski mgr inż. Olga Kazimierska dr inż. Marzena Banaszek					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	15.0	0.0	0.0	75
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours		Self-study		SUM
	Number of study hours	75	10.0		65.0		150
Subject objectives	The student recognizes basic problems connected with flows and flows around bodies. Uses the laws and methods of Fluid Mechanics and can apply them to practical problems.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W02] has a basic knowledge of physics (including optics, electricity and magnetism), chemistry, technical thermodynamics, fluid mechanics and general mechanics needed to understand and describe the basic phenomena occurring in devices and systems, energy plants and transmission networks and their environment	The student has the basic knowledge of fluid mechanics necessary to understand flow phenomena occurring in practice.			[SW1] Assessment of factual knowledge		
	[K6_K01] is aware of the need for training and self-improvement in the profession of energy and the possibility of further education; can think and act in a creative and entrepreneurial manner; can define priorities for the implementation of an individual or group task	On the basis of the knowledge acquired, the student is able to extend his/her knowledge of Fluid Mechanics and apply it to the solution of real flows occurring in the Energy Industry.			[SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	<p>Properties of fluids. Mass and surface forces in fluids. Equations of fluid motion. The Bernoulli equation. Hydrostatic lift. Pressure distribution calculations. Flow in pipes. The similarity of flows and modeling laws. Basic field theory. Field operators: gradient, velocity flux, divergence, rotation and circulation of velocity. Mass conservation law. Basic wing theory: geometrical and dynamic characteristics of foils. Potential flows. Laboratory: flow visualization. Reynolds experiment for laminar and turbulent flow. Energy losses in pipeflow. Pressure distribution around a circular cylinder. Flow through orifices. Flow rate measurement in a pipeflow. Orifice, nozzle and Venturi flow rate meters.</p>														
Prerequisites and co-requisites															
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 524 794 557">Subject passing criteria</th> <th data-bbox="799 524 1137 557">Passing threshold</th> <th data-bbox="1142 524 1481 557">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 564 794 589">Practices</td> <td data-bbox="799 564 1137 589">50.0%</td> <td data-bbox="1142 564 1481 589">25.0%</td> </tr> <tr> <td data-bbox="456 595 794 620">Exam</td> <td data-bbox="799 595 1137 620">60.0%</td> <td data-bbox="1142 595 1481 620">50.0%</td> </tr> <tr> <td data-bbox="456 627 794 651">Laboratory</td> <td data-bbox="799 627 1137 651">100.0%</td> <td data-bbox="1142 627 1481 651">25.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Practices	50.0%	25.0%	Exam	60.0%	50.0%	Laboratory	100.0%	25.0%
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Recommended reading	Basic literature	<p>Cengel Y.A, Cimbala J.M. Fluid Mechanics Fundamentals and Applications, McGraw Hill White F. M. Fluid Mechanics, McGraw-Hill</p>													
	Supplementary literature	<p>Prieve D. C. A Course in Fluid Mechanics with Vector Field Theory, Carnegie Mellon University, Fall 2000</p>													
	eResources addresses	Adresy na platformie eNauczenie:													
Example issues/ example questions/ tasks being completed	<p>Discuss the physical properties of fluids. Types of forces acting in a fluid. Analyze the mass conservation law for an incompressible fluid. Present the equations of fluid motion. Application of the Bernoulli integral to real flows.</p>														
Work placement	Not applicable														

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