



## Subject card

Subject name and code	Fluid Mechanics, PG_00055388						
Field of study	Mechanical Engineering						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
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			Polish		
Semester of study	4	ECTS credits			6.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Krzysztof Tesch				
	Teachers		dr inż. Marzena Banaszek dr inż. Marta Drosińska-Komor prof. dr hab. inż. Krzysztof Tesch				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	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	60	16.0		74.0	150	
Subject objectives	Objective of the subject is to supply the student with the theoretical and practical knowledge, enabling him to solve engineering computational and experimental problems related to fluid mechanics.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W09] possesses basic knowledge within the range of thermodynamics and fluid mechanics, construction and operation of heat generating devices, process equipment, including renewable energy sources, cooling and air conditioning		The student has basic knowledge in the field of thermodynamics and fluid mechanics, construction and operation of thermal energy devices, process equipment, including renewable energy sources as well as refrigeration and air conditioning		[SW1] Assessment of factual knowledge		
	[K6_U06] is able to use mathematical and physical models for analysing the processes and phenomena occurring in mechanical devices within the range of material strength, thermodynamics and fluid mechanics		The student is able to use mathematical and physical models to analyze the processes and phenomena occurring in mechanical devices in the field of material strength, thermodynamics and fluid mechanics		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W02] possesses an organized knowledge on physics, including classic mechanics, acoustics, optics, electricity and magnetism, shows knowledge of the elements of quantum physics		The student has structured knowledge of physics including classical mechanics, acoustics, optics, electricity and magnetism, demonstrates knowledge of the elements of quantum physics		[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURES Introduction and basic definitions. Properties of fluids. Models of fluids. Fluids in equilibrium. Determination of hydrostatic forces. Archimedes' law. Methods of fluid flow description. General motion of fluid. Deformation of fluid element. Vortex motion of fluid. Principles of conservation of mass, momentum and energy. Balance of entropy. Navier-Stokes equation. Bernoulli equation. Similarity of flow phenomena. Potential flows. Principles of gas dynamics - subsonic and supersonic flows.</p> <p>PRACTICAL EXERCISES Kinematics of flows. Laminar and turbulent flows in pipes - averaging of flow parameters. Practical applications of Bernoulli equation. Determination of forces acting on channel walls and on surfaces of bodies moving in fluids.</p> <p>LABORATORY EXERCISES Visualization of flows. Outflow from orifices. Measurements of flow intensity in open channels and pipes. Characteristics of water turbine. Research of flow around lifting foils. Modelling of gas flow by hydrodynamic analogy.</p>														
Prerequisites and co-requisites	Knowledge of differential and integral calculus, differential and integral equations and principles of vector calculus. Knowledge of principles of classical mechanics of solids.														
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="453 575 794 607">Subject passing criteria</th> <th data-bbox="799 575 1141 607">Passing threshold</th> <th data-bbox="1145 575 1484 607">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="453 613 794 645">Written exam</td> <td data-bbox="799 613 1141 645">50.0%</td> <td data-bbox="1145 613 1484 645">40.0%</td> </tr> <tr> <td data-bbox="453 651 794 683">Laboratory experiments reports</td> <td data-bbox="799 651 1141 683">100.0%</td> <td data-bbox="1145 651 1484 683">30.0%</td> </tr> <tr> <td data-bbox="453 689 794 707">Two practical exercises tests</td> <td data-bbox="799 689 1141 707">50.0%</td> <td data-bbox="1145 689 1484 707">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written exam	50.0%	40.0%	Laboratory experiments reports	100.0%	30.0%	Two practical exercises tests	50.0%	30.0%
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Example issues/ example questions/ tasks being completed	-														
Work placement	Not applicable														