



Subject card

Subject name and code	Fluid Mechanics, PG_00055414						
Field of study	Mechatronics						
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			Polish		
Semester of study	3	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
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						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	0.0	0.0	45
	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	45		6.0		49.0	100
Subject objectives	The aim of the course is to provide the student with theoretical and practical knowledge of fluid mechanics, allowing for solving engineering computational problems related to fluid mechanics.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W04] has organized and theoretically supported, advanced knowledge in the field of general mechanics, strength of materials, theory of mechanisms and machine dynamics, fluid dynamics, hydraulics and pneumatics, machine construction and engineering graphics		The student has an ordered and theoretically founded knowledge of general mechanics, material strength, theory of mechanisms and dynamics of machines, fluid mechanics, hydraulics and pneumatics, machine construction and engineering graphics		[SW1] Assessment of factual knowledge		
	[K6_U01] is able to acquire information from literature, databases and other, properly chosen sources, integrate these information, interpret them, draw conclusions and formulate opinions		The student is able to obtain information from literature, databases and other properly selected sources, integrate the obtained information, interpret it, as well as draw conclusions and formulate and justify opinions		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_U03] has self-learning skills		The student has the ability to self-study		[SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>LECTURE Introduction and basic definitions. Properties of fluids. Fluid models. Fluid equilibrium state. Determination of hydrostatic pressure. Archimedes' law. Methods of describing fluid movement. General fluid movement. Fluid element deformation. Swirling fluid movement. Principles of conservation of mass, momentum and energy. Balance of entropy. Navier-Stokes equation. Bernoulli equation.</p> <p>PRACTICAL EXERCISES Kinematics of flows. Laminar and turbulent flows in a pipe - averaging flow parameters. Practical application of Bernoulli's equation. Determination of forces acting on the walls of channels and surfaces of flowing bodies. Solving simplified forms of the Navier-Stokes equation.</p> <p>LABORATORY Visualization of flows. Outflow from the holes. Measurement of the flow rate in open channels and pipelines. Characteristics of a water turbine. Examination of the flow around the supporting airfoils. Modeling of gas flows with the use of hydrodynamic analogy.</p>								
Prerequisites and co-requisites	Knowledge of differential and integral calculus, differential equations and the basics of vector calculus. Basic knowledge of classical solid state mechanics								
Assessment methods and criteria	<table border="1" data-bbox="448 546 1498 607"> <thead> <tr> <th data-bbox="448 546 794 577">Subject passing criteria</th> <th data-bbox="794 546 1141 577">Passing threshold</th> <th data-bbox="1141 546 1498 577">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 577 794 607">Written exam</td> <td data-bbox="794 577 1141 607">50.0%</td> <td data-bbox="1141 577 1498 607">100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written exam	50.0%	100.0%
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Written exam	50.0%	100.0%							
Recommended reading	Basic literature	Tesch K.: Mechanika płynów, Wyd. Politechniki Gdańskiej, Gdańsk 2008							
	Supplementary literature	Puzyrewski R., Sawicki J.: Podstawy mechaniki płynów i hydrauliki, PWN Warszawa 1998							
	eResources addresses	Adresy na platformie eNauczanie:							
Example issues/ example questions/ tasks being completed	-								
Work placement	Not applicable								