

## SDAŃSK UNIVERSITY 的 OF TECHNOLOGY

## Subject card

Subject name and code	Fluid Mechanics, PG_00055388								
Field of study	Mechanical Engineering								
Date of commencement of studies	October 2024		Academic year of realisation of subject			2025/2026			
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	Department of Energy and Industrial Apparatus -> Faculty of Mechanical Engineering and Ship Technology						p Technology	
Name and surname	Subject supervisor		prof. dr hab. inż. Krzysztof Tesch						
of lecturer (lecturers)	Teachers								
Lesson types and methods	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	Seminar	SUM	
of instruction	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 classes includ plan	n didactic ed in study	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_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			
	[K6_W09] possesses 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			

Subject contents	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.						
	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.						
	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.						
Prerequisites and co-requisites	Konowledge 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	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%				
Recommended reading	Basic literature	Tesch K.: Mechanika płynów, Wyd. Politechniki Gdańskiej, Gdańsk 2008 Tesch K, Banaszek M, Laboratorium mechaniki płynów, Wydawnictwo FPPOiGM, Gdańsk 2016 http://www.pg.gda.pl/~krzyte/students/laboratorium.pdf					
	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	Not applicable					