GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fluid Mechanics, PG_00055894		
Field of study	Power Engineering, Power Engineering, Power Engineering		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2022/2023
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	5.0
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 mgr inż. Marta Drosińska-Komor dr inż. Wojciech Włodarski 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

Mechanika płynów - Moodle ID: 29207
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29207

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	5.0	60.0	125

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_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	The student is aware of the need for further education and self-improvement within the scope of his occupation as a power engineering specialist as well as opportunities for further education; he is able to think and act in a creative and entrepreneurial way; he is able to determine priorities for the realization of an individual or group task	[SK2] Assessment of progress of work
[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 basic knowledge of physics (including optics, electricity and magnetism), chemistry, technical thermodynamics, fluid mechanics and general mechanics, necessary for understanding and describing basic phenomena occurring in and around power equipment and systems, installations and transmission networks	[SW1] Assessment of factual knowledge

Subject contents	LECTURE: Kinematics and dynamics of a fluid. Energy and entropy for continuous media. Conservation equations. Constitutive equations. Closed systems of equations. Statics. Inviscid fluids. Gasdynamics 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. Calculation of pipe losses. Cylinder flow problem.
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	

Subject passing criteria	Passing threshold	Percentage of the final grade
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	
Example issues/ example questions/ tasks being completed	1 Give the definition of stream lines and surfaces and vortex lines and surfaces. What differential equation are the these lines described by? 2. What velocities does a fluid material point consist of? Give the equation with the drawing and explain the meaning of the individual symbols and their physical interpretation. 3. Provide (formula and drawing) and explain the content of Helmholtz's first theorem on vorticity. 4. Give the differential form of the mass conservation equation. What do the individual symbols mean? How can this equation be simplified in stationary, incompressible and potential cases? 5. Give the differential form of the momentum conservation equation. What do the individual symbols mean? What is the physical interpretation of the entire equation and individual terms? 6. Give Newton's hypothesis for compressible fluid. What do the individual symbols mean? Why is it being introduced? 7. Give the form of the Navier-Stokes equation depending on the density and viscosity coefficient. 8. Give and explain Pascal's law. 9. Provide and explain Archimedes' law.	
Work placement	Not applicable	