GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics of continuous media, PG_00037284		
Field of study	Technical Physics		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2025/2026
Education level	first-cycle studies	Subject group	Optional subject group 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	3	Language of instruction	Polish polish
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Division of Atomic Molecular and Optical Physics -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics -> Wydziały Politechniki Gdańskiej		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Piotr Weber	
	Teachers	dr Piotr Weber	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=1355

Moodle ID: 1355 Fizyka ośrodków ciągłych
https://enauczanie.pg.edu.pl/2025/course/view.php?id=1355

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	30	2.0	18.0	50

Subject objectives

Familiarizing students with the basics of continuous media physics and its applications.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U01] Can learn independently, obtain information from literature, databases and other properly selected sources.	The student increases their knowledge through independent work and study. The student independently performs and analyzes calculations.	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
[K6_W01] Understands the importance of physics and its applications in connection to civilization.	Understands the importance of knowledge in the field of physics for humanity.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K6_W02] Has systematized knowledge of the basics of physics, including mechanics, thermodynamics, electricity and magnetism, optics, atomic and particle physics, solid-state physics, nuclear and elementary particle physics.	The student has organized knowledge of the basic branches of physics	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects

Subject contents

The lecture presents the basics of the physics of continuous media. It is divided into several parts. In the first part, the basic concepts from hydrodynamics, aerodynamics, hydrostatics and the theory of elasticity are introduced. Also the concepts of mass forces and surface forces are introduced. The next parts of the lecture contain:

- Fluid kinematics (Euler method, Lagrange method). Description of fluid particle deformation.
- Fluid dynamics including the conservation equations of mass, momentum, angular momentum and energy.
- Hydrostatics
- concept of non-viscous fluid
- vortices in non-viscous fluid
- Elements of the laminar boundary layer theory
- Elements of the theory of turbulent motion
- Surface phenomena
- Elements of the theory of elasticity

During the exercises, students will solve problems related to selected topics discussed in the lecture, and they will also derive longer formulas that appear in the topics discussed in the lecture. Topics covered in the exercises include:

- Fluid kinematics
- Fluid dynamics
- Hydrostatics
- Elements of the theory of elasticity

Prerequisites and co-requisites

The student knows the basics of linear algebra, differential and integral calculus of functions of many variables, vector analysis

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	0.0%	0.0%
Exam	50.0%	100.0%

Recommended reading

Basic literature	L. D. Landau, J.M. Lifszyc, "Fluid mechanics", Pergamon Press 1987 O. Gonzalez, A. M. Stuart, "A First Course in Continuum Mechanics", Cambridge University Press, 2008
Supplementary literature	C. Pozrikidis, "Fluid dynamics", Kluwer Academic Publishers, 2001
eResources addresses	Basic https://enauczanie.pg.edu.pl/2025/course/view.php?id=1355 - e-resources

Example issues/ example questions/ tasks being completed

1. Describe the forces acting on a fluid particle (volume forces and surface forces).
2. Parameters of mass, energy and momentum transport in fluids (describe these concepts).
3. The Cauchy-Helmholtz theorem in the description of a fluid particle
4. Description of the fluid in the Lagrange method; fluid description in Euler's method;
5. Derive Reynolds transport theorems.

Work placement

Not applicable

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