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 2025	Academic year of realisation of subject	2027/2028
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 -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Piotr Weber	
	Teachers		

Lesson types

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

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_W01] understands the importance of physics and its applications in connection to civilization	The student discovers the importance of the laws and theorems presented in the framework of continuous media physics.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K6_U01] learns independently, obtains information from literature, databases and other properly selected sources	The student correctly uses the terminology used in hydrodynamics and the theory of elasticity. The student has knowledge of various applications of hydrodynamics and the theory of elasticity..	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools
[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 knows the mathematical apparatus used in hydrodynamics and the theory of elasticity. The student knows how to describe systems within the framework of continuous media physics.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation

Subject contents

Course content – lecture

The lecture presents the basics of the physics of continuous media. It is divided into three thematic parts. In the first part, basic information from linear algebra and vector analysis will be presented. These issues will be presented in terms of applications in the description of continuous media. In the second part, the physics of fluids will be presented: These issues presents following issues: volume forces, surface forces, thrusts, description of fluid flow (Euler method, Lagrange method), Navier-Stokes equation, hydrostatic laws and elements of whirl theory. In the third part, the following problems related to the mechanics of solids will be presented: the state of stress, the state of deformation, relations between stresses and strains in an elastic state, plasticity, plasticity conditions and the laws of plastic flow.

Course content – exercises

The exercises present examples of the application of the laws and theorems learned during the lecture.

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">The student knows the basics of linear algebra, differential and integral calculus of functions of many variables, vector analysis</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Multiple-choice test</td><td>50.0%</td><td>50.0%</td></tr><tr><td>Exam</td><td>50.0%</td><td>50.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">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</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">C. Pozrikidis, "Fluid dynamics", Kluwer Academic Publishers, 2001</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">1. Explain the concept of a continuous medium; explain the concept of a particle of a continuous medium.
2. Continuous medium hypothesis.
3. Describe the forces acting on a fluid particle (mass forces and surface forces).
4. Give the form of Bernoulli's equation for potential and sustained fluid motion.
5. Derive Reynolds' transport theorem.
6. Starting from the basic equilibrium equation for a fluid, derive the relationship describing the change in pressure with depth for an incompressible fluid.</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="3">Not applicable</td></tr>
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