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 2021	Academic year of realisation of subject	2023/2024
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
Semester of study	5	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Zakład Fizyki Atomowej, Molekularnej i Optycznej -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics		
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

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_W02	The student has an organized knowledge of the basic fields of physics.	[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects
K6_U01	The student increases his knowledge. The student perform calculations and analyzes results.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information

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 sections 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 inviscid fluid
- vortices in inviscid fluid
- Elements of the laminar boundary layer theory
- Elements of the theory of turbulent motion
- Surface phenomena
- Elements of the theory of elasticity

<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>Exam</td><td>50.0%</td><td>100.0%</td></tr>
<tr><td></td><td>0.0%</td><td>0.0%</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">Adresy na platformie eNauczanie:
Fizyka ośrodków ciągłych 2023/2024 - Moodle ID: 34136
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34136
Fizyka ośrodków ciągłych 2023/2024 - Moodle ID: 34136
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34136</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">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.</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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