GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics II, PG_00058752		
Field of study	Environmental Engineering		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Division of Computational Chemical 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 Małgorzata Franz	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	30.0	0.0	0.0	0.0	45

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	45	5.0	58.0	108

Subject objectives

The aim of the course is to familiarize students with the issues of classical mechanics, electrodynamics and elements of modern physics.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] has knowledge of physics, including mechanics, thermodynamics, optics, electricity and magnetism, nuclear physics and solid state physics, including knowledge necessary to: 1) understand the basic physical phenomena related to material durability, fluid mechanics and hydraulics, building physics, geodetic measurements ; 2) understanding the principles of operation of basic electrical devices and systems; 3) solving project tasks of the sanitary industry;	The student describes and interprets the basic physical phenomena, predicts the course of phenomena based on the learned laws, performs logical reasoning adequate to the solved physical problem.	[SW1] Assessment of factual knowledge
[K6_U01] has the ability to self-education, can obtain information from literature, databases and other sources, uses information technology, Internet resources; can integrate the obtained information, make their interpretation, as well as draw conclusions and formulate and justify opinions	The acquired knowledge allows for independent analysis of selected physics issues in the surrounding reality. The student carries out correct calculations and does transformations on units.	[SU4] Assessment of ability to use methods and tools

<table>
<tr><td>Subject contents</td><td>Course content – lecture
LECTURES: Static equilibrium and elasticity: conditions of static equilibrium and its examples, stress, strain and elastic modulus, elasticity and plasticity. Temperature and amount of heat: temperature, temperature measurement, thermal expansion of solids and fluids, amount of heat, specific heat, heat of fusion and heat of vaporization. Heat transport: convection, thermal conduction, thermal radiation, use of solar thermal energy. Laws of thermodynamics: quantities describing the state of a system, the first law of thermodynamics, the second law of thermodynamics, the Carnot cycle, entropy, the third law of thermodynamics. Fluids: density, pressure and viscosity, fluids at rest, Pascal's law and hydraulic press, Archimedes' law (floating bodies, apparent weight in a fluid). Fluid dynamics: motion of ideal fluids, continuity equation, Bernoulli equation. Mechanical vibrations and waves: simple, damped and forced harmonics, mechanical waves, superimposition of waves, deflection, reflection and refraction of waves, standing waves, the Doppler effect. Electrostatics, electric current and magnetostatics: Coulomb's law and electric field, electric current intensity and density, electric resistance and specific resistance, Ohm's law, magnetic field, Lorentz force, charge movement in a magnetic field, electrodynamic force. Nuclear energy: atom and its nucleus, nuclear fission, nuclear reactor, thermonuclear fusion.

TUTORIALS: . 1. Introduction to the subject. 2. Equilibrium conditions. 3. Heat transport. 4. Laws of thermodynamics. 5. Fluid mechanics. 6. Fluid dynamics. 7. Vibrations. 8. Waves. 9. Electric field I. 10. Electric field II. 11. Direct current and capacitors. 12. Magnetic field I. 13. Magnetic field II. 14. Nuclear physics.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge from "Physics I" - semester I</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Midterm colloquium</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Written exam</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. D.Holiday, R.Resnick, J.Walker. Podstawy fizyki. T.1 - T.5; PWN, Warszawa 2003. 2. Cz. Bobrowski. Fizyka. Krótki kurs; WNT, Warszawa (dowolne wydanie).

2. University Physics V. 1. - V. 3. ISBN-13: 978-83-948838-1-2</td></tr>
<tr><td>Supplementary literature</td><td>1.J.Orear. Fizyka T.1 i T.2; WNT, Warszawa (dowolne wydanie).
2.J.Massalski. Fizyka dla inżynierów. T.1 i T.2; WNT, Warszawa 2007.</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>Sample exam question:Explain when a body is in static equilibrium and show the conditions of static equilibrium due to translational and rotational motion.

Sample exercise task:A meter measuring rod is horizontal and in equilibrium when it is supported on the point at the 50 cm mark. When two 5 g coins were placed on the rod at 12 cm, the blade had to be moved to the 45.5 cm mark to keep the rod in balance. What is the mass of this rod?</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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