GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Fundamentals of Physics, PG_00047650		
Field of study	Informatics		
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 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Atomic Physics and Luminescence -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Patrycja Stefańska-Ptaszek	
	Teachers	dr hab. inż. arch. Jan Kozicki dr inż. Michał Piłat dr inż. Patrycja Stefańska-Ptaszek prof. dr hab. Marek Czachor	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	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	3.0	27.0	75

Subject objectives

Providing the student with the basic knowledge of physics helpful in further education.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study	Student has the ability to recognize and explain the basic and complex phenomena, concepts and laws concerning the basics of physics and modern physics.	[SW1] Assessment of factual knowledge
[K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions	Student has the ability to solve simple problems regarding classical mechanics, statistical physics and thermodynamics, oscillatory and wave motion, and of wave nature of light.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Course content – lecture
LECTURE

Kinematics and dynamics of a material point. Principle of conservation of energy. Principle of conservation of momentum and angular momentum. Mechanics of rigid body. Basic properties of gravitational field. Heat, work, internal energy, gas transformations. Laws of thermodynamics. Elements of kinetic theory of gases. Maxwell-Boltzmann distributions. Entropy, reversible and non-reversible processes. Harmonic oscillator, addition of oscillations. Elastic waves. Basic properties of acoustic waves. Energy density and intensity of wave. Parameters of the medium, wave impedance. Elements of geometrical optics. Wave optics: light as electromagnetic wave, dispersion, interference, diffraction, and polarization of waves. Basics of holography. Electric field intensity. Electric field of a point-like charge and of a system of charges. Electric potential of a point-like charge and of a system of charges. Relationship between the intensity of electric field and electric potential. Gauss' theorem. Electric dipole.

PRACTICE

Problems on kinematics of progressive motion, description of the motion in Cartesian system. Velocity, acceleration, normal and tangential acceleration. Problems on kinematics of rotational motion, description of the motion in Cartesian system and in a polar coordinate system. Problems on dynamics of progressive motion, applications of Newton's laws. Dynamics laws in non-inertial frame of reference. Problems on conservation of energy, momentum and angular momentum. Problems related to the first law of thermodynamics in the case of an ideal gas. Problems related to Maxwell distribution. Calculation of entropy changes in reversible transformations of an ideal gas. Examples of harmonic motion. Basics of wave motion. Wave energy density, Poyntings vector, wave intensity. Problems related to the interference of light. Diffraction and polarization of light. Fraunhofer single slit diffraction. Malus's law.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>Solving the problems.</td><td>50.0%</td><td>33.0%</td></tr>
<tr><td>Exam.</td><td>50.0%</td><td>67.0%</td></tr>
</table>
</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. D. Halliday, R. Resnick, J. Walker, Podstawy Fizyki tom 1-5, PWN.

2. Bujko A., Zadania z fizyki z rozwiązaniami i komentarzami, WNT.

3. Collection of physics problems published at the website:

www.mif.pg.gda.pl/zz/</td></tr>
<tr><td>Supplementary literature</td><td>1. Orear J., Fizyka, tom 1 i 2, WNT</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>Explain energy density of wave motion.

Enumerate methods of light polarization.</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
</table>

Document generated electronically. Does not require a seal or signature.