GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics I, PG_00047722		
Field of study	Biomedical Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Full-time studies	Mode of delivery	blended-learning
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	Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Patrycja Stefańska-Ptaszek	
	Teachers	dr inż. Patrycja Stefańska-Ptaszek dr inż. Ireneusz Linert	

Lesson types and methods of instruction

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: 2.0						

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	50.0	100

Subject objectives

Providing the student with the specialist knowledge concerning the basic rules of physics immediately relevant to the technical areas.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions	Student enumerates and explains the basic phenomena, concepts, and laws concerning classical mechanics, mechanics of fluids, statistical physics and thermodynamics. Solves simple problems of classical mechanics, statistical physics and thermodynamics.	[SK4] Assessment of communication skills, including language correctness [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SK2] Assessment of progress of work
[K6_W03] knows and understands, to an advanced extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	Student enumerates and explains the basic and the complex phenomena, concepts and laws concerning the basics of physics and modern physics.	[SW1] Assessment of factual knowledge

Subject contents

LECTURE

1. Kinematics and dynamics of a material point. Principle of conservation of energy. Principle of conservation of momentum and angular momentum. Basic properties of gravitational field. Elements of mechanics of fluids.

2. Heat, work, internal energy, gas transformations. Elements of kinetic theory of gases. Entropy, reversible and non-reversible processes. Laws of thermodynamics.

3. Harmonic oscillator, addition of oscillations. Elastic waves. Basic properties of acoustic waves. Energy density and intensity of wave. Parameters of the medium, wave impedance.

4. Elements of geometrical optics. Wave optics: dispersion, interference, diffraction, and polarization of waves. Basics of holography. Sources of light.

5. Einstein's postulates. Lorentz's transformation and its consequences. Relativistic optics.

6. Structure of atomic nucleus. Nuclear forces. Radioactivity.

7. Wave-particle duality. Wave function. The Heisenberg uncertainty relations. Schrödingers equation.

PRACTICE

1. 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.

2. 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.

3. Examples of harmonic motion. Basics of wave motion. Wave energy density, Poyntings vector, wave intensity.

4. Problems related to the interference of light. Diffraction and polarization of light. Fraunhofer single slit diffraction. Malus's law.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Knowledge of the lecture material	50.0%	67.0%
Solving of the problems	50.0%	33.0%

Recommended reading

Basic literature

1. D. Halliday, R. Resnick, J. Walker, Podstawy Fizyki tom 1-5, PWN.

2. Sawieliew I. W., Wykłady z fizyki, volume I-3, PWN.

3. Bobrowski Cz., Fizyka, WNT

4. Collection of physics problems published at the website: www.mif.pg.gda.pl/zz/

	Supplementary literature	1. Orear J., Fizyka, volume 1 i 2, WNT. 2. Resnick R., Halliday D., Fizyka, volume 1 i 2, PWN. 3. R.P. Feynman, Feynmana Wykłady z Fizyki, volume 1-3, PWN. 4. Bujko A., Zadania z fizyki z rozwiązaniami i komentarzami, WNT.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	Conservation of energy, momentum, and angular momentum in the system of particles. Simple harmonic motion. Energy density of the longitudinal wave. Universal law of radioactive decay	
Work placement	Not applicable	