GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics, PG_00058987		
Field of study	Environmental Engineering		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	9.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Division of Complex Systems Spectroscopy -> Institute of Physics and Applied Computer Science -> Faculty of Applied Physics and Mathematics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marcin Dampc	
	Teachers	dr inż. Marcin Dampc	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	25.0	35.0	0.0	0.0	0.0	60
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	60	8.0	157.0	225

Subject objectives

1.Deeper understanding of the laws of classical physics.

2.Acquaintance with the laws of modern physics which are the base of modern technology.

3. Put up the physical problems and resolwed them, in relation to future engineering problems.

4. Create practices in the use of physical devices, taking measurements and study the results.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	Is capable of solving physics problems and discussing obtained results.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[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;	Possess knowledge on mentioned fields of physics. and is capable of solving physics problems.	[SW1] Assessment of factual knowledge

Subject contents

LECTURES Methodology of physics. Physical quantities and their units. MECHANICS. Kinematics of a translation and rotation motions. Newtons laws. Dynamics of a rigid body: the rotational motion around a fixed axis, moment of inertia, principal axes, Steiner (parallel axis) theorem, torque and angular momentum, Newtons equation of rotational motion, precession and gyroscopes. The conservation laws in mechanics. Fluids statics: Pascal and Stokes laws. Fluids dynamics. Bernoulli equation. Flow of real liquids. Stokes law. Reynolds number. Mechanical oscillations and waves. Free, damped and driven oscillations. Mechanical resonance. Beats. Decomposition of periodical oscillations into harmonic components. Kinds of waves. Kinematical equation of a plane harmonic wave. Wave velocity. Diffraction and interference examples. Standing waves. Doppler effect.Ultrasounds. OPTICS. Spectrum of electromagnetic waves. Geometrical optics: the laws of light reflection and refraction, prism. Wave optics: polarization, diffraction and interference, diffraction grating. Spectral analysis of light, optical spectrometer. Quantum properties of radiation: thermal radiation, photoelectric effect, photons. ATOMIC PHYSICS. Bohr model of the hydrogen atom. X-rays. Lasers: stimulated emission, laser action, kinds of lasers, applications. Hologrphy.De Broglie waves. Heisenberg uncertainty principle. TUTORIALS 1. Kinematics quantities. Motion with a constant acceleration. 2. Newtons laws. Force and torque. 3. Moment of inertia. 4. Work, kinetic and potential energy, the conservation law of mechanical energy. 5. Conservation law of angular momentum. 6. Simple and damped harmonic oscillators. 7. Characteristics of waves. Standing waves. 8.Priperties of light. 9. Diffraction grating. 10. Thermal radiation. 11. Photoelectric effect. 12. Bohr"s model of hydrogen atom.

Prerequisites and co-requisites

Elementary physics from the secondary school

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Written exam	50.0%	60.0%
Midterm colloquium	50.0%	40.0%

Recommended reading

Basic literature	1. Marta Skorko, FIZYKA, W-wa ,PWN. (dowolne wydanie). 2. Czesław Bobrowski, FIZYKA krótki kurs, W-wa, WNT.(dowolne wydanie).
Supplementary literature	1. Jerzy Masalski, FIZYKA dla inżynierów. część I, W-wa, WNT. (dowolne wydanie).
eResources addresses	Adresy na platformie eNauczanie: Fizyka WILIŚ Niestacjonarne (2022/2023) - Moodle ID: 18409 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18409

Example issues/ example questions/ tasks being completed	I. A body at rest in a system is capable of doing work if: A. the potential energy of the system is positive B. the potential energy of the system is negative C. it is free to move in such a way as to decrease its kinetic energy D. it is free to move in such a way as to decrease the potential energy of the system E. it is free to move in such a way as to increase the potential energy of the system II. Two wires made of diferent materials have the same uniform current density. They carry the same current only if: A. their lengths are the same B. their cross-sectional areas are the same C. both their lengths and cross-sectional areas are the same D. the potential diferences across them are the same E. the electric ¯elds in them are the same III. In the formula $F = qv \times B$: A. F must be perpendicular to ~v but not necessarily to ~B B.F must be perpendicular to ~B but not necessarily to ~v C. v must be perpendicular to ~B but not necessarily to ~F D. all three vectors must be mutually perpendicular E. F must be perpendicular to both ~v and ~B
Work placement	Not applicable

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