GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics, PG_00055797		
Field of study	Transport and Logistics		
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	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Faculty of Ocean Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Klaudia Wrzask	
	Teachers	dr inż. Klaudia Wrzask mgr inż. Irena Dziwisz-Olszak mgr inż. Joanna Grochowalska	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	15.0	15.0	0.0	0.0	60

E-learning hours included: 0.0

Fizyka (PG_00055797) Transport i Logistyka, sem .1, WĆL, zimowy 2022/23 - Moodle ID: 24470
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=24470

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	10.0	80.0	150

Subject objectives

Acquisition of basic knowledge from selected branches of classical and modern physics. Gaining skills of qualitative understanding of selected principles and laws of classical and contemporary physics and quantitative analysis of selected phenomena in this field. Learning basic techniques and methods measurement of selected physical quantities

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W02] has a basic knowledge in physics, including technical mechanics, fluid mechanics, solid-state physics, optics and acoustics necessary to understand basic physical phenomena occurring in transport	Has knowledge of the basics of physics in in the field of technical mechanics, fluid mechanics, solid state physics, optics and acoustics necessary to understand the basic physical phenomena occurring in transport	[SW1] Assessment of factual knowledge
[K6_U02] can work individually and in a team, communicate through various techniques in professional environment and also record, analyse, and present the results of work, can estimate the time needed to complete a given task	The student is able to work individually and in a team, communicate using various techniques in a professional environment, as well as document, analyze and present the results of his work, can estimate the time needed to complete the task	[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment

Subject contents	Introduction: Physical quantities, vectors, the international system of units (SI), standards of mass, time and length, an overview of the quantities occurring in nature. Principles of dynamics: fundamental interactions, I law of dynamics, II law of dynamics, equations of motion, trajectory, 3rd law of dynamics, friction. Definition of work for constant and changing forces, work and energy theorem, definition of power, conservative forces. The principle of conservation of energy: potential energy, potential energy of gravity, principle conservation of mechanical energy, the principle of conservation of energy. Conservation Principle of Momentum: center of mass, momentum of the body system, conservation of momentum, rocket motion, body collisions. The principle of conservation of angular momentum: rotational motion, moment of inertia, kinetic energy in rotary motion. Moment of force, definition of angular momentum, relationship between the moment of force and angular momentum, angular momentum of a rigid body, conservation of angular momentum. Special Theory of Relativity: Galileo transformation, Michelson-Morley experiment, Einstein's principle of relativity, simultaneity of events, time relativity, time dilation, twin paradox, length reduction, Lorentz transformation, velocity transformation, relativistic momentum and energy. Simple harmonic motion: inclination, velocity, acceleration, force and energy in motion harmonic. Mathematical pendulum, physical pendulum, damped harmonic motion, vibrations forced, mechanical resonance. Mechanical waves: transverse and longitudinal waves, wave reflection, harmonic wave, sound waves, wave intensity. Harmonic wave interference, wave amplification and blanking, standing wave, string vibrations, Doppler effect. Electric field: electric charges, definition of electric field strength, dipole field electricity, movement of a charge in an electric field, a dipole in an electric field, a flux p. electric, Gauss's law, examples.Electric potential: definition of potential difference, relationship between potential difference and electric field strength. Point charge field and charge system potential, energy charge interactions, conductor potential, charge density on the conductor surface, van de Graaff generator. Electric capacity: capacity definition, flat capacitance, capacitor with dielectric, dielectric polarity, electric field energy. Electric current: amperage and current density, electrical resistance, Ohm's law, specific resistance, superconductivity, work and power current, Kirchhoff's laws Magnetic field: Lorentz force, the definition of a magnetic induction vector, a conductor with a current in a magnetic field, a frame with a current in a magnetic field, magnetic dipole moment, charge movement in a magnetic field, cyclotron frequency, cyclotron, mass spectrometer, Ampere's law, magnetic field of a rectilinear conductor and a solenoid, two conductors parallel with current, Biot-Savart law, circular conductor with current, magnetic moment an electron in an atom. Magnetic properties of matter: paramagnets, Curie's law, diamagnets, ferromagnetics, magnetic hysteresis. The phenomenon of electromagnetic induction: magnetic flux, the law of induction Faraday, Lenz's rule, alternating current generator, induced electric field, currents vortex, self-induction phenomenon, solenoid inductance, magnetic field energy. The gravitational field: Galileo's experiment, the law of universal gravitation, measurement of the constant gravity, gravitational field strength and potential, weight and weightlessness, tides, laws Kepler, satellite motion, I and II space velocity, elements of general relativity. Hydrostatics: properties of liquids, Pascal's law, hydrostatic pressure, Archimedes' law, swimming bodies. Hydrodynamics: fluid motion characteristics, Bernoulli's law, Toricelli's law, viscosity, non-viscous and viscous fluid flow, laminar and turbulent flow, Reynolds number, resistance the resort.Thermodynamics: internal energy, the first law of thermodynamics, the application of the first law of thermodynamics to isosversions of an ideal gas, graphical representation of the work, second rule thermodynamics, Carnot cycle, Carnot engine efficiency, entropy, 3rd law of thermodynamics. Electromagnetic waves: propagation of an electromagnetic wave, field energy electromagnetic, Poynting vector, spectrum of electromagnetic waves, propagation radio and television waves in the atmosphere, the use of electromagnetic waves. in radiolocation.
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exercise	70.0%	30.0%
Lacture	70.0%	30.0%
Laboratory	70.0%	40.0%

Recommended reading

Basic literature	Fizyka dla Szkół Wyższych. Tom 1 i Tom 2, darmowe podreczniki OpenStax
Supplementary literature	David Halliday, Robert Resnick, Jearl Walker, Podstawy fizyki. T. 1-5, Wydawnictwo Naukowe PWN, 2012
eResources addresses	

Example issues/ example questions/ tasks being completed	1. Give the second principle of dynamics and conclusions resulting from it 2. What are conservative and non-conservative forces; how much is the work they do; Provide examples of conservative and non-conservative forces 3. Give examples of systems moving in a harmonic way; What equation describes the harmonic motion straight?; Write and draw the dependence of the deflection from the position of the equilibrium from time; What happens if the frequency of the forcing force is close to the natural frequency of the system? 4. Draw and describe the serial connection of three capacitors with capacities C1, C2 and C3; Set dependence on equivalent capacity 5. Ohm law for the closed circuit: give the formula and explain it in the diagram with the current source and the receiver 6. Give and explain the formula for Lorentz strength. How he changes a return of strength depending on the signs of the load (draw)?
Work placement	Not applicable