



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 dr 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						
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 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	<p>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.</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exercise	70.0%	30.0%
	Lecture	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	Adresy na platformie eNauczanie: 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	

<p>Example issues/ example questions/ tasks being completed</p>	<ol style="list-style-type: none"> 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 C_1, C_2 and C_3; 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)?
<p>Work placement</p>	<p>Not applicable</p>