GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Physics 1, PG_00042018					
Field of study	Power Engineering, Power Engineering					
Date of commencement of studies	October 2021		Academic year of realisation of subject		2021/2022	
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		English	
Semester of study	2		ECTS credits		2.0	
Learning profile	general academic profile		Assessment form		exam	
Conducting unit	Faculty of Ocean Engineering and Ship Technology					
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Małgorzata Śmiałek-Telega			
	Teachers		dr hab. inż. Małgorzata Śmiałek-Telega			

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	0.0	30
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie:						

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	30	5.0	15.0	50

Subject objectives	Acquisition of basic knowledge in selected branches of physics, both classical and modern. Acquiring the skills of qualitative understanding of selected principles and laws of classical physics and modern and quantitative analysis of selected phenomena in this area Understanding the basic techniques and methods of measurement of selected physical Developing social skills, such as emotional intelligence (the ability to work in a group of students), with a view to effective problem solving and tasks, sense of responsibility, honesty and integrity in academia and society.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_U01] can obtain information from literature and other sources, organize, interpret it and draw and formulate conclusions; has the ability to self-educate, interprets the results of completed engineering tasks, is able to design simple energy systems and their systems		
	[K6_W02] has a basic knowledge of physics (including optics, electricity and magnetism), chemistry, technical thermodynamics, fluid mechanics and general mechanics needed to understand and describe the basic phenomena occurring in devices and systems, energy plants and transmission networks and their environment	The student explains the basic knowledge in the field of physics, chemistry, technical thermodynamics and fluid mechanics, necessary to understand and describe the basic phenomena occurring in energy devices and systems and in their environment, the power industry and opportunities for further education	[SW1] Assessment of factual knowledge

Subject contents	Introduction: Physical quantities , vectors , the international system of units (SI) , mass , time and length, an overview of the sizes found in nature .
	Principles of dynamics : fundamental interactions, the first law of dynamics, the second law of dynamics equations of motion trajectory , the third law of dynamics, friction. The definition of work for constant and variable force, the assertion of labor and energy , the definition of power , conservative forces .
	The principle of conservation of energy : energy potential , the potential energy of gravity , the law of conservation of mechanical energy , the principle of conservation of energy . The principle of conservation of momentum : the center of mass , the momentum of the bodies , the principle of conservation of momentum , rocket motion , collision of bodies.
	The principle of conservation of angular momentum : rotation, moment of inertia , kinetic energy in a rotating motion . Moment of force , the definition of angular momentum , the relationship between the torque value and angular momentum , angular momentum of a rigid body , the principle of conservation of angular momentum .
	The special theory of relativity : Galilean transformation , Michelson -Morley experiment , Einstein's principle of relativity , simultaneity of events , the relativity of time, time dilation , twin paradox , length contraction , Lorentz transformation , the transformation speed , relativistic momentum and energy.
	Simple harmonic motion : swing , velocity, acceleration , force and energy of the harmonic motion . Pendulum , physical pendulum , damped harmonic motion , forced vibration , mechanical resonance .
	Mechanical waves : transverse and longitudinal waves , reflection of waves , harmonic waves , sound waves , the intensity of the wave. Interference of harmonic waves , strengthening and decay of waves, standing waves , vibrations, strings , Doppler effect.
	Electric field : electric charges , the definition of the electric field , the electric dipole field , the movement of charge in an electric field , an electric dipole p , p electrical flow , Gauss's law , examples.
	Electric potential : the definition of potential difference , the relationship between potential difference and the intensity of the electric field . The potential field of a point charge , and the freight , energy impact loads , the potential guide, the charge density on the surface of the conductor , van de Graaff generator .
	Electrical capacity : definition of capacity, flat capacitor , the capacitor dielectric , dielectric polarization , the energy of the electric field . Electric current : the current and current density , electrical resistance , Ohm's law , resistivity , superconductivity , work and power current law, Kirchhoff
	Magnetic field: the Lorentz force , the definition of the vector magnetic induction , current-carrying conductor in a magnetic field , the frame of the current in a magnetic field , magnetic dipole moment , the movement of charge in a magnetic field , cyclotron frequency , cyclotron mass spectrometer , Ampere's law , magnetic field straight conductor and a solenoid , two conductors in parallel with the current, Biot- Savart law , circular guide with the current, the magnetic moment of the electron in an atom . Magnetic properties of matter : paramagnetics , right Curie diamagnets , ferromagnets , magnetic hysteresis .
	Electromagnetic induction : Magnetic flux , Faraday's law of induction , Lenz's law , AC generator , the induced electric field , eddy currents , the phenomenon of self-induction , inductance of the solenoid , magnetic energy .
	The gravitational field : the experience of Galileo's law of universal gravitation , the measurement of the gravitational constant , the intensity and the potential of the gravitational field , gravity and weightlessness , tidal , Kepler's laws , satellite motion , and second cosmic velocity , elements of the general theory of relativity.
	Hydrostatics : properties of liquids, Pascal's law , hydrostatic pressure , Archimedes' principle , swimming bodies.
	Hydrodynamics : characteristics of fluid motion , Bernoulli's law , law Toricellego , viscosity, flow of non-viscous liquid and viscous , laminar and turbulent flow , Reynolds number , the resistance of the medium.
Prerequisites and co-requisites	

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written test (open questions)	50.0%	100.0%

Recommended reading	Basic literature	David Halliday, Robert Resnick,Jearl Walker *Fundamentals of Physics, Wiley, any edition*
	Supplementary literature	H.D. Young, R.A. Freedman, SEAR'S AND ZEMANSKY'S UNIVERSITY PHYSICS WITH MODERN
		PHYSICS, Addison-Wesley Publishing Company, wyd. 12. z 2008 r.
		D.C. Giancoli, Physics Principles with Applications, 6th Ed., Addison-Wesley, 2005; Physics: Principles
		with Applications with MasteringPhysics, 6th Ed., Addison-Wesley 2009.
		R.A. Serway, Physics for Scientists and Engineers with Modern Physics, 8th Ed., Brooks/Cole, Belmont
		2009; zapowiadane jest kolejne wydanie w styczniu 2013 r.
		P.A. Tipler, G. Mosca, Physics for Scientists and Engineers, Extended Version, W. H. Freeman 2007
	eResources addresses	

Example issues/ example questions/ tasks being completed	Give the second law of dynamics and the conclusions resulting therefrom
	What are conservative and non-conservative forces, what is the work done by them; Give examples of conservative and non-conservative forces
	Give examples of systems moving harmonically; What equation describes the simple harmonic motion?; Write and draw a relationship deflection from the equilibrium position of the time; What happens if the frequency of the exciting force is close to the natural frequency of the system?
	Draw and describe a series connection of three capacitors with capacities C1, C2 and C3; Determine capacitance of entire series
	Ohm's law for closed circuit: enter the formula and explain it in the diagram containing the source of real power and a receiver
	Give and explain the formula for the Lorentz force. How does the sense of the force depending on the character load (draw)?

Work placement	Not applicable