



Subject card

Subject name and code	Physics I, PG_00033290						
Field of study	Mechatronics, Mechatronics						
Date of commencement of studies	October 2020	Academic year of realisation of subject			2020/2021		
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			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Faculty of Mechanical Engineering						
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	30.0	15.0	0.0	0.0	0.0	45
	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	45		5.0		75.0	125
Subject objectives	To know physical quantities and phenomena, to describe, analyse and understand more complex physical problems with the use of advanced mathematics						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U03		Student solves simple technological problems using laws of physics		[SU2] Assessment of ability to analyse information		
	K6_W02		Student solves simple technological problems using laws of physics		[SW1] Assessment of factual knowledge		
	K6_U01		Student adopts the knowledge required for the analysis of physical phenomena		[SU4] Assessment of ability to use methods and tools		
Subject contents	<p>LECTURE: Introduction: International system of units. Standards of units. Description of motion. Newton's law. Work, energy, power. Conservation of energy. Centre of mass, linear momentum of a system, conservation of linear momentum – examples. Angular motion of a rigid body, moment-of- the-force, angular momentum, conservation of angular momentum Simple harmonic motion, damped harmonic motion. Forced vibration. Resonance. Mechanical waves. Harmonic waves. Interference of waves. Standing wave. Doppler's effect. Special theory of relativity. Galilean transformation, relativity effects. Lorentz transformation. Electric field. Electric field strength. Coulomb's law. Electric dipole. Gauss's law. Potential of electric field. Potential of a charge system. Potential of a conductor. Electrical capacitance. Electric current: current strength, Ohm's law, Kirchhoff's law, power of electric current Magnetic field: Lorentz's force, charge and conductor with current into magnetic field. Ampere's law. Two parallel conductors with currents. Biot-Savart's law. Conductors and dielectrics, dia-, para- and ferromagnetic materials, phenomenon of electromagnetic induction Geometrical optics: reflection and refraction of light, mirrors, lens, optical fibers.</p> <p>EXERCISE: Solving problems illustrating Newton's laws, translational and rotational motions of bodies. Solving problems applying conservation energy, momentum and angular momentum. Solving problems of simple harmonic motion and damped harmonic motion. Solving problems of propagation waves in elastic medium. Calculation of deflection and velocity of particle of medium during propagation waves. Calculation of dilatation of time and contraction of length using Lorentz's transformation. Solving problems illustrating dependence of mass, momentum and energy of bodies on the velocity. Calculation of the forces, the electrostatic field strength and the electrostatic potential in point charges system, solution of problems using the Gauss' law, calculation of the capacitance of capacitors, calculation of trajectory motion of charged particles in electric and magnetic field, determination of magnetic induction using the Biot-Savart's and Amper's law, solving problems illustrating the phenomenon of electromagnetic induction</p>						
Prerequisites and co-requisites	High school level physics knowledge						
Assessment methods and criteria	Subject passing criteria		Passing threshold		Percentage of the final grade		
	Final exam - theory and problems		50.0%		60.0%		
	Final test - solving problems		50.0%		40.0%		

Recommended reading	Basic literature	1. Bobrowski Cz., Fizyka: krótki kurs, WNT, Warszawa 2005 2. Orear J., Fizyka t. 1,2, WNT, Warszawa 1993
	Supplementary literature	1. Halliday D., Resnick R., Walker J., Podstawy fizyki t. 1,2,3,4 PWN, Warszawa 2003
	eResources addresses	
Example issues/ example questions/ tasks being completed	A bullet was shot at the angle of α to the horizontal. Find its final velocity and range in its highest point of trajectory is 5 m?	
Work placement	Not applicable	