GDAŃSK UNIVERSITY OF TECHNOLOGY

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

Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=32
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	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

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. 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

<table>
<tr><td>Prerequisites and co-requisites</td><td colspan="3">High school level physics knowledge</td></tr>
<tr><td>Assessment methods and criteria</td><td colspan="3"><table><tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr><tr><td>Final exam - theory and problems</td><td>50.0%</td><td>60.0%</td></tr><tr><td>Final test - solving problems</td><td>50.0%</td><td>40.0%</td></tr></table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td colspan="2">1. Bobrowski Cz., Fizyka: krótki kurs, WNT, Warszawa 2005 2. Orear J., Fizyka t. 1,2, WNT, Warszawa 1993</td></tr>
<tr><td>Supplementary literature</td><td colspan="2">1. Halliday D., Resnick R., Walker J., Podstawy fizyki t. 1,2,3,4 PWN, Warszawa 2003</td></tr>
<tr><td>eResources addresses</td><td colspan="2"></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="3">A bullet was shot at the angle of alfa to the horizontal. Find its final velocity and range in its highest point of trajectiory is 5 m?</td></tr>
<tr><td>Work placement</td><td colspan="3">Not applicable</td></tr>
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