GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mechanics II, PG_00040045		
Field of study	Mechanical Engineering, Mechanical Engineering		
Date of commencement of studies	October 2020	Academic year of realisation of subject	2021/2022
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	Part-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	3	ECTS credits	6.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Mechanics and Mechatronics -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Marek Chodnicki	
	Teachers	mgr inż. Grzegorz Banaszek dr inż. Marek Chodnicki	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	15.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Adresy na platformie eNauczanie:

Mechanika II, C, MiBM, sem. 03, zimowy 21/22, (M:31908W1) - Moodle ID: 18341
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18341

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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	115.0	150

Subject objectives

To familiarize students with the basic concepts, principles and laws of dynamics Learning him how to solve practical tasks of dynamics of material pointsTo familiarize students with the methods of determining the momentum and angular momentum of solids, the dynamic responses of supporting elements in rotational motion of body, the kinetic and the potential energy of solids Learning him how to solve practical tasks in the dynamics of solids in planar motion

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W04] possesses knowledge on mechanics, including the processes of modelling mechanical systems, statics, kinematics and dynamics of rigid objects and basic knowledge on vibrations	Student prepares physical models of real objects.Student presents basic concepts, principia and laws of dynamicsStudent solves practical problems referring to dynamics of particles Student evaluates work, power, kinematical energy and potential energy of particles Student determinates inertia parameters of rigid bodies(statical moment, moments of inertia, inertia products)Student determinates linear momentum and angular momentum of bodiesStudent solves practical problems referring to dynamics of planar motion of bodies Student determinates dynamical reactions at supporting point of rotating bodyStudent evaluates kinematical energy and potential energy of bodies, he/she used these terms to solve practical problems referring to dynamics of particles and bodies	[SW1] Assessment of factual knowledge
[K6_U06] is able to use mathematical and physical models for analysing the processes and phenomena occurring in mechanical devices within the range of material strength, thermodynamics and fluid mechanics	Student uses the learned laws of mechanics to the analysis of processes and phenomena that occur in mechanical devices	[SU1] Assessment of task fulfilment
[K6_U01] is able to acquire information from specialized literary sources, databases and other resources, essential for solving engineering tasks; is able to compile the obtained information pieces and to interpret them, additionally is able to form conclusions and present justified opinion	Student becomes familiar with the literature on issues of Mechanics. Student gets acquainted with the most important branches of mechanics	

Subject contents

Information on the organization of the course. Bibliography. Dynamics and its main topics. Basic concepts in dynamics of particles. Differential equations of particle dynamics in Cartesian coordinates, polar coordinates and natural coordinates. Particular cases of motions: rectilinear motion, parabolic motion, falling down with the air resistance, harmonic motion, mathematical pendulum. Dynamics of motions for set of particles. Kinetostatics principle, kinetic energy, work-energy equation, differential form of work-energy equation. Principle of conservation of mechanical energy. Work of a constant force on a rectilinear translation, work of variable force on curvilinear translation. Power. Potential energy. Linear momentum and impulse of forces. Principle of conservation of linear momentum. Angular momentum and impulse of torques. Principle of conservation of angular momentum. Basic concepts in dynamics of rigid bodies. Inertial properties: mass, centers of gravity, Moments of inertia products of inertia. Parallel axis theorem (Huygens-Steiner theorem). Principal, central axes of inertia. Differential equations of translational motion, rotational motion, planar motion of body. Kinetic energy of body in translational, rotational and planar motion. Linear momentum for body. Angular momentum in translational, rotational and planar motion. Use of the kinetostaics principle to determine dynamic reactions in supporting points of rotating body. Dynamical balancing of rotors

Prerequisites and co-requisites

Completed course of Mathematics Completed course of Physics Completed course of Mechanics I Main attention set on basic knowledge about geometry, trigonometry, vector calculus (analysis), matrix calculus, statics, kinematics, abilities in integrations and derivation of basic mathematical formulas, basic knowledge about differential equations (inhomogeneous ordinary differential equations of 1th and 2nd order)

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam	56.0%	100.0%

Recommended reading

Basic literature	1. Wittbrodt E., Sawiak S.: Mechanika ogólna. Teoria i zadania. Wyd. PG, Gdańsk 2005 2. Sawiak S., Wittbrodt E.: Mechanika. Wybrane zagadnienia. Skrypt PG, Gdańsk 2003 3. Leyko J.: Mechanika ogólna, t. I i 2, PWN, Warszawa 1980 4. Niezgodziński M.E., Niezgodziński T.: Zbiór zadań z mechaniki ogólnej, PWN, Warszawa 1997
Supplementary literature	1. Osiński Z.: Mechanika ogólna, t. I i 2, PWN, Warszawa 1987 2. Leyko J., Szmelter J.: Zbiór zadań z mechaniki ogólnej, t. I i 2, PWN, Warszawa 1976 3. Mieszczerski I. W.: Zbiór Zadań z mechaniki, PWN, Warszawa 4. Niezgodziński T.: Mechanika ogólna. WNT, Warszawa 1999 5. Nizioł J.:Metodyka rozwiązywania zadań z mechaniki. WNT, Warszawa 2002

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Example issues/ example questions/ tasks being completed	Determine acceleration of a point whose equation of motion is described by a known function. Determine the moment of inertia of figures with the given geometry Determine distance thah will be passed by a given mass moving with an initially set velocityWrite an equation of dynamics of a given grup of solids	
Work placement	Not applicable	