GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Mechanics I, PG_00050273		
Field of study	Mechanical Engineering, Mechanical Engineering		
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 Subject group related to scientific research 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	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 Skowronek	
	Teachers	dr inż. Marek Skowronek	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	30.0	0.0	0.0	0.0	60

E-learning hours included: 0.0

Adresy na platformie eNauczanie:

Mechanics I - Design and Production Engineering - Moodle ID: 8413
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8413

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	8.0	82.0	150

Subject objectives

Acquainting students with the essential law of mechanics and forming abilities of solving problems practical, in static issues and kinematics of the point.

Learning outcomes

Course outcome	Subject outcome	Method of verification
K6_W04	Has knowledge of mechanics, including the process of modeling mechanical systems of statics, and point kinematics	[SW1] Assessment of factual knowledge
K6_U01	He is able to obtain information from professional literature, databases and other resources necessary to solve engineering tasks; He is able to integrate the obtained information and make their interpretation, as well as draw conclusions and present opinions with justification	[SU4] Assessment of ability to use methods and tools
K6_U06	Is able to use mathematical and physical models to analyze the processes and phenomena occurring in mechanical devices in the field of mechanics and selected issues of strength of materials	[SU4] Assessment of ability to use methods and tools

Subject contents	Students are acquainted with organization of the course, expected knowledge, conditions to complete the course, and suggested literature. Introduction to the subject: historical feature, mechanics and its division. Modeling in mechanics: real system, physical and mathematical models, and also meanings of: ideal rigid body, dimension-less point, concentrated force. The basic Newton's principles, and primitive notions and axiom's of mechanics. Equilibrant systems of forces. Resultant force of concurrent system of forces. Momentum of pair of forces. Resultant force and resultant momentum of spatial system of forces. Degrees of freedom, strains and their reaction forces. Statically determinate and in determinate systems. Conditions of equilibrium of system of forces, and particular systems: coplanar, concurrent, and parallel. Substitute conditions of equilibrium. Formulas of superposition, and independence of force acting. Forces, and their sources. Division of forces: reactive and active, external and internal. Gravity force and coordinates of centre of gravity. Friction forces, rolling resistance and belt drive friction. Analysis of forces in bars of truss. Basic meanings in kinematics of point: position coordinates, velocity, acceleration, and equations of motion. Description of motion of point in: vector, Cartesian, normal, and polar coordinates. Analysis of kinematics' parameters of particular systems: linear track motion, circle and ellipse track motion, uniform and uniformly accelerated motion, harmonic motion, crank-shaft system motion.
Prerequisites and co-requisites	Phisics and mathematics on the secondary level school, including in particular: geometry, thrigonometry, and also vector calculus.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Practical exercise	56.0%	50.0%
Written exam	56.0%	50.0%

Recommended reading

Basic literature	Wittbrodt E., Sawiak S.: Mechanika ogólna. Teoria i zadania. Wyd. PG, Gdańsk 2012
Supplementary literature	Osiński Z.: Mechanika ogólna. T. I i 2, PWN, Warszawa 1987 Nizioł J.: Metodyka rozwiązywania zadań z mechaniki. WNT, Warszawa 2002 Sawiak S., Wittbrodt E.: Mechanika. Wybrane zagadnienia. Teoria i zadania. Wyd. PG, Gdańsk 2007
eResources addresses	Mechanics I - Design and Production Engineering - Moodle ID: 8413 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=8413

Example issues/ example questions/ tasks being completed	Exemplary examination questions of Mechanics I 1. projection of power onto the axis 2. dot product of vectors 3. vector product of vectors 4. folding and de-folding forces (analytically and graphic) 5. moment of forces with respect to point and respect the axis 6. reduction arbitrary sets of forces to a single force and to a single pair of forces (the main force and the main torque) 7. invariants of the arbitrary set of forces 8. equilibrium conditions for arbitrary sets of forces 9. particular equilibrium conditions for arbitrary sets of forces (plat, coincident and parallel agreements) 10. alternative equilibrium conditions for planar arbitrary sets of forces 11. constraints and their reactions 12. particular arrangements: statically definable, nondefinable and unstable 13. sliding friction 14. friction cone 15. friction of cords 16. rolling resistance 17. practical methods of determining of the coefficients of friction 18. the centres of gravity, the terms and formulas 19. the centres of gravity for homogeneous lines 20. the centres of gravity for homogeneous plane figures 21. the centres of gravity for homogeneous three dimensional bodies 22. description of motion of point in the rectangular coordinate system 23. description of motion of point with the position vector 24. description of motion of point in natural coordinates

	25. path of the point 26. definition of the speed and accelerations 27. tangent and normal acceleration 28. uniform and monotonously precipitated linear motion 29. circular motion of point
Work placement	Not applicable