



## Subject card

Subject name and code	Fundamentals of Machine Design I, PG_00050269						
Field of study	Mechatronics, Mechatronics						
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	Full-time studies	Mode of delivery			at the university		
Year of study	2	Language of instruction			Polish		
Semester of study	4	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Machine Design and Vehicles -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Artur Olszewski					
	Teachers	dr hab. inż. Artur Olszewski mgr inż. Tomasz Żochowski mgr inż. Katarzyna Mazur					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	15.0	15.0	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	6.0		49.0		100
Subject objectives	A student achieves basis of machine design, construction and maintenance.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	K6_U07				[SU1] Assessment of task fulfilment		
	K6_W04				[SW3] Assessment of knowledge contained in written work and projects		
	K6_U05				[SU4] Assessment of ability to use methods and tools		
	K6_U06				[SU4] Assessment of ability to use methods and tools		
Subject contents	<p>LECTURE Designing of objects and processes as a basic element of engineering. Describing and analysing of the problem, searching of the best solution - methods and techniques. Designing of elements of machines with use of strength criteria - engineering calculations. Static and dynamic calculations. Safety factor. Engineering calculations using static models and lifetime performance and reliability. Methods of judgments and solutions. Simulations and optimizations in designing. Methods of analyses of kinematic models. Algorithms of designing. Modern tools for designing machines - CAD 2D and 3D. Advantages and disadvantages of 3D modeling. Calculation of welded elements and fastener. Preloaded elements. Calculation and designing of screws. Pipes and valves. Elastic elements. Springs and elastomers. Shafts and axes: modelling and optimisation. Comparison of friction and shape fasteners. Rolling bearings. Calculations and catalogs. Characteristics of elastic elements. Springs and elastomers. Shafts and axes -designing of shape, calculations of dimensions, optimization. Rolling bearings. Durability of rolling bearings - catalogs and methods of selection. EXERCISES Engineering calculations. Static calculations. Safety factor. Fasteners. Welded elements - calculations and optimization. Screw elements. Preloaded elements. Characteristics of elastic elements and springs. Springs, elastomers. Shafts and axes: modelling and optimization. Comparison of friction and shape fasteners. Rolling bearings. Calculations and catalogs. Characteristics of elastic elements. Springs and elastomers. Shafts and axes -designing of shape, calculations of dimensions, optimization. Rolling bearings. Durability of rolling bearings - catalogs and methods of selection. LABORATORY Introduction to 2D and 3D computer tools. AUTOCAD - 2D simple CAD program. Basis of 3D modelling. 2D technical drawings created from 3D model. DESIGNING Design of simple mechanical device. Optimisation of a concept, engineering calculations. Assembly drawing, workshop drawings. Theoretical models.</p>						
Prerequisites and co-requisites	Knowledge in field of Engineering drawing Knowledge in field of Mechanics Knowledge in field of Strength of materials Knowledge in field of Metrology						

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		60.0%	100.0%
Recommended reading	Basic literature	1. Fundamentals of machine design - lectures and problems - series of handbooks, edited by GUT 2. Kochanowski M.: Podstawy konstrukcji maszyn. Wybrane zagadnienia. Gdańsk: P. Gdańska 2002. 3. Pokojski J.: Systemy doradcze w projektowaniu maszyn. Warszawa: Wyd. N-T 2005.	
	Supplementary literature	1. Beitz G. P. W.: Nauka konstruowania. W-wa: Wyd. N-T 1984. 2. Tarnowski W.: Podstawy projektowania technicznego. Warszawa: Wyd. N-T 1997.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	.		
Work placement	Not applicable		