



Subject card

Subject name and code	Fundamentals of Machine Design I, PG_00055446						
Field of study	Mechatronics						
Date of commencement of studies	October 2022	Academic year of realisation of subject			2023/2024		
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			3.0		
Learning profile	general academic profile	Assessment form			exam		
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						
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	3.0	27.0	75		
Subject objectives	A student achieves basis of machine design, construction and maintenance.						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_U07] is able to design elements of mechatronic systems taking into consideration given application and economic criteria, using appropriate methods, techniques and tools				[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment		
	[K6_U06] is able to identify and formulate specification of simple, practical engineering tasks, distinctive for mechatronics				[SU4] Assessment of ability to use methods and tools		
	[K6_W04] has organized and theoretically supported knowledge in terms of general mechanics, strength of materials, theory of mechanisms and machine dynamics, fluid dynamics, hydraulics and pneumatics, machine construction and engineering graphics				[SW3] Assessment of knowledge contained in written work and projects		
	[K6_U05] is able to use properly choosen tools to compare design solutions of elements and mechatronics systems according to given application and economic crtierions (e.g. power demand, speed, costs)				[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 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. 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. Optimization of a concept, engineering calculations. Assembly drawing, workshop drawings. Theoretical models.</p>		
Prerequisites and co-requisites	<p>Knowledge in field of Engineering drawing Knowledge in field of Mechanics Knowledge in field of Strength of materials Knowledge in field of Metrology</p>		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
		60.0%	100.0%
Recommended reading	Basic literature	<p>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.</p>	
	Supplementary literature	<p>1. Beitz G. P. W.: Nauka konstruowania. W-wa: Wyd. N-T 1984. 2. Tarnowski W.: Podstawy projektowania technicznego. Warszawa: Wyd. N-T 1997.</p>	
	eResources addresses		
Example issues/ example questions/ tasks being completed	.		
Work placement	Not applicable		