



Subject card

Subject name and code	Fundamentals of machine design, PG_00055889						
Field of study	Power Engineering						
Date of commencement of studies	October 2025	Academic year of realisation of subject				2026/2027	
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				5.0	
Learning profile	general academic profile	Assessment form				exam	
Conducting unit	Institute Of Mechanics And Machine Design -> Faculty Of Mechanical Engineering And Ship Technology -> Wydział Politechniki Gdańskiej						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Michał Wodtke				
	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	15.0	0.0	60
	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	60		5.0		60.0	125
Subject objectives	Understanding the principles of operation and engineering calculation models of basic elements and connections used in machine construction and acquiring knowledge about the rules of their construction. Acquainting with the main functions and application purposes of machine parts and the phenomena accompanying their operation. Acquiring knowledge how to select and construct basic machine elements and simple mechanical systems.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K6_W04] has structured knowledge of mechanics, including the issues of material strength and general principles of shaping structures, necessary to conduct basic strength analyzes and design simple mechanical or construction systems for power industry or environmental engineering; knows the basics of machine construction and the most commonly used construction and operating materials		The student creates computational models necessary for the design of machine elements. Analyses and selects appropriate computational models of connections. The student identifies load and stress states in critical points of analysed machine elements and evaluates their safety. Calculates structural parameters of machine elements and connections. Selects catalogue elements. Creates technical documentation, draws conclusions from design.			[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge	
	[K6_U01] can obtain information from literature and other sources, organize, interpret it and draw and formulate conclusions; has the ability to self-educate, interprets the results of completed engineering tasks, is able to design simple energy systems and their systems		The student identifies phenomena occurring in machine elements, obtains information from literature sources, integrates them, draws appropriate conclusions, is able to carry out the selection of basic machine elements using engineering calculation models			[SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment	

Subject contents	<p><b>Lecture:</b> Design of machine elements based on strength criterion engineering calculations. Fatigue strength. Factor of safety and determination of allowable stresses. Connections (welded, screwed, shaft-hub). Design recommendations for shafts and axles and selection of catalogue components to work with them. Rolling bearings, selection. Fatigue strength. Components of power transmission system (couplings, mechanical transmissions). Springs.</p> <p><b>Practical exercises:</b> practical calculation analysis of selected machine elements (e.g. welded and screw connections).</p> <p><b>Project:</b> design of a simple mechanical system. Formulation of requirements, engineering calculations. Selection of standardised components. Creation of technical documentation.</p>														
Prerequisites and co-requisites	Mathematics, Physics, Engineering graphics, Mechanics, Strength of materials, Materials science, Mechanical engineering Technology, Metrology														
Assessment methods and criteria	<table border="1" data-bbox="448 517 1497 680"> <thead> <tr> <th data-bbox="448 517 794 555">Subject passing criteria</th> <th data-bbox="794 517 1141 555">Passing threshold</th> <th data-bbox="1141 517 1497 555">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 555 794 611">Written pass from practical exercises</td> <td data-bbox="794 555 1141 611">50.0%</td> <td data-bbox="1141 555 1497 611">20.0%</td> </tr> <tr> <td data-bbox="448 611 794 645">Project</td> <td data-bbox="794 611 1141 645">50.0%</td> <td data-bbox="1141 611 1497 645">30.0%</td> </tr> <tr> <td data-bbox="448 645 794 680">Exam</td> <td data-bbox="794 645 1141 680">50.0%</td> <td data-bbox="1141 645 1497 680">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Written pass from practical exercises	50.0%	20.0%	Project	50.0%	30.0%	Exam	50.0%	50.0%
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Written pass from practical exercises	50.0%	20.0%													
Project	50.0%	30.0%													
Exam	50.0%	50.0%													
Recommended reading	Basic literature	<ol style="list-style-type: none"> <li>1. Siwek B.: Połączenia spawane, zgrzewane, lutowane i klejone - Wykład z Podstaw Konstrukcji Maszyn z ćwiczeniami rachunkowymi. Wyd. Politechniki Gdańskiej.</li> <li>2. Maciakowski R.: Połączenia śrubowe - Wykład z Podstaw Konstrukcji Maszyn z ćwiczeniami rachunkowymi. Wyd. Politechniki Gdańskiej.</li> <li>3. Maciakowski R., Majewski W.: Połączenia wału z piastą - Wykład z Podstaw Konstrukcji Maszyn z ćwiczeniami rachunkowymi. Wyd. Politechniki Gdańskiej.</li> <li>4. Kochanowski R.: Wały i osie - Wykład z Podstaw Konstrukcji Maszyn z ćwiczeniami rachunkowymi. Wyd. Politechniki Gdańskiej.</li> <li>5. Maciakowski R., Majewski W.: Sprzęgła - Wykład z Podstaw Konstrukcji Maszyn z ćwiczeniami rachunkowymi. Wyd. Politechniki Gdańskiej.</li> <li>6. Kochanowski M.: Podstawy konstrukcji maszyn z rysunkiem technicznym. Wyd. Politechniki Gdańskiej, Gdańsk 1998.</li> <li>7. Druet K., Kochanowski M., Romanowski P.: Łożyska toczne. Wyd. Politechniki Gdańskiej.</li> </ol>													
	Supplementary literature	<ol style="list-style-type: none"> <li>1. Sikora J., Maciakowski R.: Przekładnie zębate geometria i kinematyka zazębienia - Wykład z Podstaw Konstrukcji Maszyn z ćwiczeniami rachunkowymi. Wyd. Politechniki Gdańskiej.</li> <li>2. Podstawy Konstrukcji Maszyn. A series of monographs published by PWN.</li> </ol>													
	eResources addresses	Adresy na platformie eNauczanie:													
Example issues/ example questions/ tasks being completed	<p>Check/assess the safety of the component/assembly and/or the connections used in it. Determine/calculate the dimensions or maximum load on the component/assembly or connection used.</p> <p>Welded joints describe the design models for butt and fillet welds indicating the differences between them.</p> <p>Bolted connections - describe the calculation models with differences between them.</p> <p>Shaft to hub connections - discuss the characteristic features and range of application. Describe the design models for three selected connections indicating the differences between them.</p>														
Work placement	Not applicable														

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