



## Subject card

Subject name and code	Theory of Machines and Engineer Graphies, PG_00054687						
Field of study	Biotechnology						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2022/2023		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study		
Mode of study	Full-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	2		ECTS credits		6.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Michał Ryms				
	Teachers		dr inż. Anna Dettlaff  dr hab. inż. Michał Ryms  dr inż. Anna Kuczyńska-Łażewska  dr hab. inż. Katarzyna Januszewicz				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	0.0	30.0	0.0	75
	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	75		10.0		65.0	150
Subject objectives	Student is able to recreate spatial elements on a drawing plane, using orthogonal and axonometry, as well as cross-section projections. Is familiar with basic dimensioning guidelines and how to prepare technical drawings (working and assembly drawings). Student recognizes the tension strength in technology. Classifies, describes and draws the basic connections used in the chemical industry. Calculates the dimensions of the tank or installation. Recognises the basic types of valves and fittings found in chemical industry.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U10		The student can use known methods of preparing technical drawings and mathematical models describing strength of materials.		[SU1] Assessment of task fulfilment		
	K6_W10		The student has mastered the knowledge related to the use of technical drawing, graphical presentation of machine elements and mechanical systems, as well as knowledge of basic strength calculations of objects.		[SW1] Assessment of factual knowledge		

Subject contents	Over the course of lectures, student familiarizes himself with methods of spatial element recreation in a the drawing plane, theory of engineering design and selected methods of strength calculations of the materials. The scope of program includes, in particular: - Introduction to the subject (formats, lines, scales, technical writing), - Methods of imaging three-dimensional objects on a drawing plane (object projections, finding the missing projection and isometric projections, cross-sections, revolved sections with dimensioning guidelines), - Working and assembly drawings preparation, - Disjoint connection drawings (screw joints, pipe threaded connections, bolts, fittings and elbows, thread protections against dismantling), - Drawings of permanent joints (welded, soldered and riveted joints), - Drawings of selected elements from heating and plumbing installation and armature (with emphasis on tanks, piping, valves, sight glasses, liquid level gauges and measuring points). Different examples from chemical industry. - Full installations projects (drawings and calculations).Drawing fittings elements of chemical, food and pharmaceutical installations with special attention to tanks, piping, valves, sight glasses, liquid level gauges and measuring connectors. Tank calculations. Selection from the catalogues the tank fittings and equipments. Design of the tank (calculations, drawings).		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Exam	60.0%	20.0%
	Midterm colloquiums	60.0%	40.0%
	Drawings dokumentation	60.0%	10.0%
	Project	60.0%	30.0%
Recommended reading	Basic literature	1. M. Ryms, W.M. Lewandowski, Chemical Theory of Machines, PWN 2017, 2. W.M. Lewandowski, Maszynoznawstwo chemiczne, Gdańsk 1998, 3. T. Dobrzański, Rysunek techniczny maszynowy, WNT 2013, 4. M. Kochanowski, Zapis konstrukcji z geometrią wykreślną, Wyd. PG 2002, 5. K. Paprocki, Zasady zapisu konstrukcji, OWPW, Warszawa 2000,	
	Supplementary literature	websites materials, programs instructions, catalogues and industry standards	
	eResources addresses	Adresy na platformie eNauczanie: MASZYNOZNAWSTWO I GRAFIKA INŻYNIERSKA - BT2023 - Moodle ID: 28696 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28696">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=28696</a>	
Example issues/ example questions/ tasks being completed	Learning about technical drawing (e.g.: prepare orthogonal projections of an item on the basis of its axonometric projection and vice versa, dimension a given element, draw a following item as a half-view-half section).  Drawing fittings of the chemical, food and pharmaceutical industries with emphasis on tanks, pipelines, valves, sight glasses, liquid level gauges and measuring connectors (e.g.: draw a vertical sight glass, what are the possible variants of its construction, what it is used for).  Tank design calculations. Selection of tank fittings. The design of the tank containing calculations and drawings.		
Work placement	Not applicable		

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