GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Basics of construction, PG_00061920		
Field of study	Materials Engineering, Materials Engineering		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
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	3	Language of instruction	Polish
Semester of study	5	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Polymer Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Janusz Datta	
	Teachers	prof. dr hab. inż. Janusz Datta	

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	0.0	0.0	30.0	15.0	45

E-learning hours included: 0.0

eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=1717

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	5.0	25.0	75

Subject objectives

The student gains knowledge of designing steel structures such as reactors, tanks, and vessels. They learn how to select appropriate materials for structures and auxiliary equipment, as well as how to calculate stresses in structural elements. Additionally, they become familiar with the construction and operation of various machine components

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_K01] Understands the need to improve professional and personal competencies; is conscious of own limitations and knows when to turn to experts, properly establishes priorities helping to accomplish tasks defined by oneself or others.	The Student understands the need for competence development, recognizes own limitations, uses expert assistance, and sets task priorities.	[SK5] Assessment of ability to solve problems that arise in practice
[K6_U03] Can critically analyze and evaluate the functioning – particularly in the context of materials engineering –existing technical solutions, particularly equipment, objects, systems, processes.	The student is able to critically analyze the functioning of existing technical solutions and evaluate them in the context of materials engineering	[SU2] Assessment of ability to analyse information
[K6_W05] Has the knowledge of mechanics, technology and electrical engineering, including engineering graphics and using computer aid, the use of databases in the design of technological processes.	The student has knowledge of mechanics, technology, and electrical engineering, and is familiar with the basics of engineering graphics, computer-aided design, and the use of databases in technological process design.	[SW1] Assessment of factual knowledge
[K6_U06] can integrate obtained information, interpret it and draw conclusions, as well as formulate and justify opinions.	The student is able to integrate the obtained information, interpret it, draw conclusions, and formulate and justify opinions.	[SU5] Assessment of ability to present the results of task

<table>
<tr><td>Subject contents</td><td>Course content – project
Design of a mixing device structure, such as an emulsifier, reactor, or homogenizer, for a specified medium and given technical parameters (Vr, p, temperature, material, density, type of bottom ends, mixing power, ...) and its intended application. Selection of a series of structural components (flange, nozzles, valves, ...) based on the performed calculations (wall thickness of the cylindrical part, bottom thickness, pressure, apparatus mass, column slenderness, yw, buckling).
Course content – seminar
Main topics: Dimensional and fit tolerances. Surface roughness and waviness: Material joining. Basics of material selection for structural components, considering various operating conditions such as environment and temperature. Stress and strain analysis: Discussion of the construction and operation of various machine components, including shafts and bearings. Modern hybrid and multi-material structures, as well as sandwich types SPS and SIP.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>General information on modern construction materials</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>project</td><td>51.0%</td><td>60.0%</td></tr>
<tr><td>seminar</td><td>51.0%</td><td>40.0%</td></tr>
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</td></tr>
<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Wilczewski T., Pomoce projektowe z podstaw maszynoznawstwa chemicznego, Wydawca:Politechnika Gdańska, 2008, Gdańsk

2.Pikoń J.,Podstawy Konstrukcji aparatury chemicznej Cz 1, Tworzywa konstrukcyjne , Wydawca: Państwowe Wydawnictwo Naukowe, 1979, Warszawa.

3.Pikoń J.,Podstawy Konstrukcji aparatury chemicznej Cz 2, Elementy aparatury chemiczbnej, Wydawca: Państwowe Wydawnictwo Naukowe, 1979, Warszawa.

4. Uzi Mann, Principles of Chemical Reactor Analysis and Design, 2009, John Wiley & Sons,Texas (ACCESS ONLINE)</td></tr>
<tr><td>Supplementary literature</td><td>Gawdzik A.j. Tabiś B., Podstawy projektowania reaktorów chemicznych, Wydawca: Politechnika Krakowska, 1987; Kraków</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
</table>
</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td>1) Calculate the hoop stress acting on the cylindrical wall of an emulsifier, knowing the values: d, p, and g.

2) Will buckling occur in a tank supported on 4 tubular columns with a height of 1.5 m when a mass of 2 tons acts on it?

3) Select a material for the gasket of the inspection port (consider various situations).</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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