GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00056109		
Field of study	Mechatronics		
Date of commencement of studies	October 2022	Academic year of realisation of subject	2024/2025
Education level	first-cycle studies	Subject group	
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	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Michał Landowski	
	Teachers		

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	0.0	0.0	0.0	30
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	30	0.0	0.0	30

Subject objectives

The student obtains knowledge about the structure and techniques of forming composite materials.

The student obtains knowledge and skills related to the selection and design of composite materials.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W11] has a basic knowledge about the life cycle of mechatronic systems and objects	The student learns about the issues of durability and exploitation of elements made of composite materials. The student is able to predict the effects of using various types of reinforcement and matrix on the durability of components operated in various environments.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K6_W10] has a basic knowledge about development trends in terms of engineering and technical sciences and scientific disciplines: Mechanical Engineering, Automation, Electronics and Electrical Engineering, adequate for Mechatronics curse	The student knows the current development trends in the replacement of conventional materials with composite materials. The student is able to list the benefits of using composite materials and the risks associated with their use.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[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)	The student is able to choose the technology of manufacturing elements from composite materials in terms of economy and utility.	[SU5] Assessment of ability to present the results of task [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information

Subject contents	Lecture: Definition and division of composite materials.Factors influencing the properties of composite materials.The geometry of the reinforcement of composite materials.Characteristics (properties, manufacturing techniques) of glass, carbon, aramid, boron, silicon carbide and aluminum oxide fibers.Prediction of elastic properties and strength as a function of quantity and geometry of the reinforcement.Structure and importance of the boundary layer in polymer and metal matrix composites.Manufacturing techniques, typical properties and practical examples of applications of metal, ceramic and polymer composites. Techniques for the production of materials by powder metallurgy. Technological defects of composite materials. Composite structural materials. Gradient materials. Computer aided production and material selection.
Prerequisites and co-requisites	Basic knowledge of materials science and strength of materials.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
	50.0%	100.0%

Recommended reading

Basic literature	• A.Boczkowska, J.Kapuścinski, Z.Linderman, D.Witemberg-Perzyk, S.Wojciechowski : Kompozyty. PW 2003. • W. Królikowski, Polimerowe kompozyty konstrukcyjne, PWN 2012 • J.Sobczak, Kompozyty metalowe, 2002 • Imielińska K., Papanicolaou G.C., Wprowadzenie do nauki o materiałach kompozytowych Kompozyty polimerowe, Wybrane zagadnienia, Skrypt PG, Gdańsk 1998. • F.L. Mattews, R.D.Rawlings, Composite Materials. 2008
Supplementary literature	• Dobrzański L.A.: Podstawy nauki o materiałach i metaloznawstwo. WNT, Warszawa, 2002. • M. Reyne, Composite solutions, JEC Group 2006
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

Choose a technology of making a carbon fiber rod.

Give examples of applications of metal matrix composite materials in the automotive industry.

Choose the material for the construction of the yacht's hull.

Work placement	Not applicable