



Subject card

Subject name and code	Material Engineering & Manufacturing Technology (Material Engineering), PG_00048408						
Field of study	Ocean Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2022/2023		
Education level	second-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	1		Language of instruction		English		
Semester of study	1		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Ship Manufacturing Technology, Quality Systems and Materials Science -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Janusz Kozak				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	15.0	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		5.0		40.0	75
Subject objectives	The student becomes familiar with modern materials used in shipbuilding and marine engineering, as well as with materials, which seem to have prospects in this application area. The student learns the general properties of these groups of materials, the scope of their application and their specific characteristic data. The student learns the relationship between the chemical composition, its microstructure, processing technology, mechanical properties and resistance to various types of corrosion and other types of operational damage						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_W05] has an organized, widened knowledge on design, construction and operation of ocean technology objects and systems		The student knows the possibilities and principles of using materials in the process of designing a structure, he also knows the mutual relations between the chemical composition, microstructure and properties of materials on the one hand, and the technological processes of building the structure and the conditions of its operation on the other hand.		[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation		
	[K7_W07] has knowledge on the development perspectives of ocean technology objects and systems, knows the newest and most relevant achievements in ocean technology		The student knows new and advanced materials used in the construction of shipbuilding and ocean engineering structures, and knows the possibilities and limitations of modern and traditional structures that result from the use of these materials.		[SW2] Assessment of knowledge contained in presentation [SW1] Assessment of factual knowledge		
	[K7_W09] has organized, widened knowledge on the principles of sustainable development		The student knows the economic and ecological aspects of the use of various materials and the relationship of these aspects with the chemical composition, microstructure and properties of these materials.		[SW1] Assessment of factual knowledge		

Subject contents	LECTURE Overview of corrosion-resistant steels. Corrosion-resistant Duplex steels. Nickel and its alloys. Cobalt and its alloys. Shape memory materials. Concrete for shipbuilding and offshore structures. Degradation in the marine environment of fiber-reinforced polymer composites. Nanomaterials. Titanium and its alloys. Maraging steels. LABORATORY Sclerometric tests of concrete hardness and strength. Duplex stainless steel microstructure tests. Corrosion resistance of Duplex steels compared to other corrosion-resistant steels. Research on the microstructure of nickel alloys. Mobile tests of hardness of metallic materials. Tests of the microstructure of Titanium alloys.		
Prerequisites and co-requisites	basic knowledge of engineering materials		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	kolokwium zaliczające	45.0%	50.0%
	sprawozdania i testy	80.0%	50.0%
Recommended reading	Basic literature	M. Jakubowski, Material Engineering. Modern materials in ship technology and ocean engineering. Textbook Manuscript. 2015 K. Emilianowicz., Instructions to the laboratory exercises on material Engineering - modern materials in ship technology and ocean engineering. Manuscript 2015	
	Supplementary literature	Dobrzański L.A., Fundamentals of Material science and metal science. <i>Engineering materials with the basics of material design</i> . WNT, Warszawa 2002. (in Polish) M. Lewandowska, K. Kurzydłowski, Structural and functional nanomaterials, PWN, Warszawa 2010. (in Polish) J. Nowacki, Duplex steel and its weldability. WNT, Warszawa 2009 (in Polish) M. Ashby, H. Sherclif, D. Cebon, Materials Engineering Science, Processing and Design. Elsevier Ltd, 2007, 2010.	
	eResources addresses	Adresy na platformie eNauczanie:	
	Example issues/ example questions/ tasks being completed		
Work placement	Not applicable		