



## Subject card

Subject name and code	Non-metallic Materials, PG_00044032						
Field of study	Ocean Engineering, Ocean Engineering						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2020/2021		
Education level	first-cycle studies		Subject group				
Mode of study	Part-time studies		Mode of delivery		at the university		
Year of study	1		Language of instruction		Polish		
Semester of study	1		ECTS credits		1.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Theory and Ship Design -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Lech Rowiński				
	Teachers		dr hab. inż. Lech Rowiński				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	10.0	0.0	0.0	0.0	0.0	10
	E-learning hours included: 0.0						
	Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9130">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9130</a>						
	Adresy na platformie eNauczanie: Materiały niemetalowe N Oceanotechnika - Moodle ID: 9130 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9130">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9130</a>						
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	10		2.0		13.0	25
Subject objectives	Provide student with basic knowledge regarding organic synthetic materials (plastics) that are utilized in machine and boat building as well as principles of selection of materials for structures, glues and surface coats supplemented with information regarding procurement of products.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W03] has a basic knowledge on hydromechanics, thermodynamics, machine construction, ecology, materials science and electronics necessary to understand the construction and operation principles of ocean technology objects and equipment		Student knows principal plastics. Student knows basic data of synthetic materials. The student is able to describe the properties of synthetic materials; He knows basic technological processes He knows basic technological processes and its influence on the usable properties of synthetic materials, he distinguishes main composites categories. He knows the basic types resins and reinforcing materials used in boat building and reinforcing materials. Student knows the principles of creating polymer composites		[SW1] Assessment of factual knowledge		
	[K6_U05] can formulate a simple engineering task and its specification within the range of design, construction and operation of ocean technology objects and systems		Student is able to select plastic material for typical technical product basing on technical specification and technological properties or indicate properties of products manufactured of considered material		[SU2] Assessment of ability to analyse information		
Subject contents	Basic definitions and nomenclature (monomers and polymers); Review of non-metallic materials - natural and synthetic (cellulose, proteins, natural caoutchouc); Material characteristics for different application areas; Thermoplastics and elastomers. Mechanical and thermal properties of thermoplastics. Procurement of products using thermoplastics. Duromers and their chemistry. Resins and reinforcements for marine application. Technological process of reinforced structures. Technological process of a large structural element of reinforced synthetic resin.						

Prerequisites and co-requisites	Basic chemistry. Basic mechanical properties of materials		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Short test during every lesson	60.0%	100.0%
Recommended reading	Basic literature	1.Dobrosz K., Matysiak A. ,Tworzywa sztuczne Warszawa WSZIP 1985  2.Kłosowska-Wołkowicz Z..Królikowski W., Penczek P..Żywiec i laminaty poliestrowe. Warszawa WNT 1980  3.Kozłowski J., Wilczopolski M..Materiałoznawstwo okrętowe czIII Okrętowe Tworzywa Polimerowe. Gdynia WSMW 1982  4.Królikowski W., Tworzywa wzmocnione i włókna wzmacniające, Warszawa WNT 1988  5.Żuchowska D., Polimery konstrukcyjne. Warszawa WNT 1995	
	Supplementary literature	1. Błędzki A.K. i inni: „Recykling materiałów polimerowych”, Wydawnictwa Naukowo Techniczne, Warszawa, 1997.  2. Composites World Journal <a href="https://gardnerweb.activehosted.com">https://gardnerweb.activehosted.com</a>	
	eResources addresses	Materiały niemetalowe N Oceanotechnika - Moodle ID: 9130 <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9130">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9130</a>	
Example issues/ example questions/ tasks being completed			
Work placement	Not applicable		