GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Engineering of Elastomers, PG_00039715					
Field of study	Materials Engineering, Materials Engineering, Materials Engineering					
Date of commencement of studies	October 2021		Academic year of realisation of subject		2023/2024	
Education level	first-cycle studies		Subject group		Optional subject group 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	3		Language of instruction		Polish	
Semester of study	6		ECTS credits		5.0	
Learning profile	general academic profile		Assessment form		exam	
Conducting unit	Department of Polymers Technology -> Faculty of Chemistry					
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Janusz Datta				
	Teachers					

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Address on the e-learning platform: https://enauczanie.pg.edu.pl/moodle/course/view.php?id=19200						

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	60	5.0	60.0	125

Subject objectives	Teaching the basic principles of elastomer's calculation and the creation of technological formulations, as well indication of the influence of selected factors on some properties of elastomers

Learning outcomes	Course outcome	Subject outcome	Method of verification
	K6_U02	Knows the basics of selecting conditions machine settings used in elastomer technology	[SU3] Assessment of ability to use knowledge gained from the subject
	K6_W06	Can calculate / choose the composition the formulation leading to elastomers	[SW1] Assessment of factual knowledge
	K6_K01	Recognizes the influence of various factors on the properties of elastomers	[SK5] Assessment of ability to solve problems that arise in practice
	K6_U03	Can analyze the functioning and evaluate the existing technical solutions	[SU1] Assessment of task fulfilment

Subject contents	Definition of elastomers. Highly flexible condition. The theory of rubber elasticity. Mooney-Rivlin equations. Static mechanical properties of elastomers. Natural rubber and synthetic rubbers - chemical structure, production and properties. Vulcanization of rubbers and reconditioning of mixtures. Modern vulcanization teams. Cross-link density. Thermoplastic elastomers. Plasticizers. Softened plastomers: polyvinyl chloride. Fiber reinforced elastomers.

Prerequisites and co-requisites	Knowledge of the methods of obtaining macromolecular compounds. Basic knowledge of impact the chemical structure of the polymer and its properties

Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Laboratory: quiz, report	50.0%	50.0%
	Lecture: written exam	50.0%	50.0%

Recommended reading	Basic literature	1) Koszelew F. F., Korniew A. E., N.S Klimow - Ogólna technologia gumy, WNT, Warszawa, 1972 2) Praca zborowa po red Z.Florjańczyka i S.Pęczka, Chemia polimerów, T2 i 3, Oficyna Wydawnicza Polit.Warszawskiej 1995 3)A.N.Gent, Engineering with Rubber, Hanser Publishers, Munich Viena New York Barcelona, 1992. 4) Praca zbiorowa: W Parasiewicz, W. Rzymski, Elastomery i przemysł gumowy, Piastów-Łodź 2006
	Supplementary literature	1) B. Łączyński, Tworzywa wielkocząsteczkowe. Rodzaje i własności,WNT,Warszawa, 1982 2) I. Franta, Elastomers and Rubber Compounding Materials,ELSEVIER, Amsterdam-Oxford-NewYork-Tokyo, 1989. 3) J. A. Brydson, Rubbery Materials, Elsevier Applied Science, London and New York, 1988.
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	1) List the three basic properties of elastomers and indicate the research methods / techniques used to determine one of them. 2) Describe the mechanism of active sulphide complex formation in the case of vulcanization with the accelerator T and ZnO. 3) Draw the volkametric curve of the mixture based on natural rubber (sulfur vulcanization) with a clear vulcanization plateau and present the method of determining the optimal vulcanization time. Replace the possible components of the vulcanizing unit and indicate where in the volkametric curve their participation in the process can be seen	
Work placement	Not applicable	