

。 GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Degradation of polymers, PG_00052970								
Field of study	Chemistry in Construction Engineering								
Date of commencement of studies	February 2024		Academic year of realisation of subject			2024/2025			
Education level	second-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	2		Language of instruction			Polish			
Semester of study	3		ECTS credits			2.0			
Learning profile	general academic profile		Assessment form			assessment			
Conducting unit	Department of Physical Chemistry -> Faculty of Chemistry								
Name and surname	Subject supervisor	dr hab. inż. Joanna Krakowiak							
of lecturer (lecturers)	Teachers								
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Projec	t	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 classes includ plan	n didactic led in study	Participation in consultation hours		Self-study SUM		SUM	
	Number of study 30 hours			2.0		18.0		50	
Subject objectives	The students have to learn the mechanisms and circumstances of the degradation processes. The main types of degradations are discussed as well as the factors which influence on these phenomenons. The students have to learn: (i) the main techniques for degradation processes monitoring; (ii) the degradation ability of a few most applied polymers; (iii) the possibility of the degradation inhibition of polymers.								
Learning outcomes	Course outcome		Subject outcome			Method of verification			
	K7_U07		The students learn the main research tools for monitoring both polymer degradation and changes a some physical mechanical features.			[SU3] Assessment of ability to use knowledge gained from the subject			
	K7_W04		The student has elementary knowledge to estimate the risk of thermal and photodegration in polymer materials.			[SW1] Assessment of factual knowledge			
	K7_W02		The student is aware of the polymers chain sturucture influence and used modifying additives on degradation process			[SW1] Assessment of factual knowledge			
	K7_K01		The student is aware of the rapid development of techniques allowing to determine both the degree of degradation of polymeric materials and the presence of factors accelerating the degradation processes. They learn the main limitations of basic research testing the susceptibility of the discussed materials to degradation.			[SK4] Assessment of communication skills, including language correctness			

Subject contents	 The mechanisms and circumstances of the degradation processes as well as the factors which influence on this phenomenon are discussed. The student has to learn which elements of the environment influence the kinetics of degradation to predict the life-time of polymer materials. The susceptibility of the basic polymers to degradation as well as the way of protection against different types of degradation (with particular emphasis on thermal and photochemical reactions) are presented. The main techniques for degradation processes monitoring are shown. In the laboratory classes, students perform five different complex experimental tasks related to degradation processes. They concern: Environmental degradation and testing reference probes The influence of antiaging agents on rubber features Thermal degradation of polymeric materials and testing reference probes Photodegradation of polymeric materials, determination of the Oxidation Induction Time OIT) Tests of mechanical and physicochemical properties of polymeric materials subjected to degradation 					
Prerequisites and co-requisites	Basic knowledge of polymer chemis	stry and physico-chemical processes				
Assessment methods	Subject passing criteria	Passing threshold	Percentage of the final grade			
and criteria	test of laboratory	50.0%	30.0%			
	performing laboratory tasks and reports	100.0%	20.0%			
	test of lectures	50.0%	50.0%			
Recommended reading	Basic literature	 ic literature 1. J. F. Rabek, Polymer photodegradation. Mechanisms and experimental methods, Chapman & Hall, 1995, London 2. K. Pielichowski, J. Njugana, Thermal Degradation Of Polymeric Materials, 2005, Smithers Rapra Technology 				
	Supplementary literature	1. J.F. Rabek,, Photodegradation of Polymers: Physical Characteristics and Applications, 2011, Springer				
	eResources addresses	Adresy na platformie eNauczanie:				
Example issues/ example questions/ tasks being completed	 Which processes occurring in polymers are slowed down by application of so-called stabilizers? Can a chemical substance acting as a stabilizer play also other roles in the polymer material? If so, provide an example. What is the impact of the structure of polymer molecules (linear, branched or networked) on its thermal stability or hydrolisis? What do we mean by biodegradation? Describe clearly the factors causing this phenomenon. 					
Work placement	Not applicable					

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