



## Subject card

Subject name and code	Degradation of polymers, PG_00052970						
Field of study	Chemistry in Construction Engineering						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
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 of lecturer (lecturers)	Subject supervisor		dr hab. inż. Joanna Krakowiak				
	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		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_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		
	K7_W04		The student has elementary knowledge to estimate the risk of thermal and photodegradation in polymer materials.		[SW1] Assessment of factual knowledge		
	K7_W02		The student is aware of the polymers chain sturcture influence and used modifying additives on degradation process		[SW1] Assessment of factual knowledge		
	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		

Subject contents	<p>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.</p> <p>In the laboratory classes, students perform five different complex experimental tasks related to degradation processes. They concern:</p> <ul style="list-style-type: none"><li>• Environmental degradation and testing reference probes</li><li>• The influence of antiaging agents on rubber features</li><li>• Thermal degradation of polymeric materials and testing reference probes</li><li>• Photodegradation of polymeric materials, determination of the Oxidation Induction Time OIT)</li><li>• Tests of mechanical and physicochemical properties of polymeric materials subjected to degradation</li></ul>		
Prerequisites and co-requisites	Basic knowledge of polymer chemistry and physico-chemical processes		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	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	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	1. Which processes occurring in polymers are slowed down by application of so-called stabilizers?  2. Can a chemical substance acting as a stabilizer play also other roles in the polymer material? If so, provide an example.  3. What is the impact of the structure of polymer molecules (linear, branched or networked) on its thermal stability or hydrolysis?  4. What do we mean by biodegradation? Describe clearly the factors causing this phenomenon.		
Work placement	Not applicable		