



Subject card

Subject name and code	Recycling of polymer materials, PG_00068312						
Field of study							
Date of commencement of studies	February 2027		Academic year of realisation of subject			2027/2028	
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	Part-time studies		Mode of delivery			at the university	
Year of study	1		Language of instruction			Polish	
Semester of study	2		ECTS credits			4.0	
Learning profile	general academic profile		Assessment form			exam	
Conducting unit	Department of Polymer Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. inż. Janusz Datta				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	9.0	0.0	18.0	0.0	0.0	27
	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	27		10.0		63.0	100
Subject objectives	To familiarize students with modern recycling technologies for polymeric materials, including mechanical, chemical, and energy recovery. To introduce the principles of selecting waste management methods according to waste properties, evaluating recycling process efficiency, and understanding their role in the circular economy and sustainable resource use.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_U05] is able to notice non-technical aspects, including environmental, economic and legal aspects, when formulating and solving design tasks. Applies occupational health and safety principles		is able to evaluate polymer recycling methods, taking into account environmental, economic, and legal aspects, and apply occupational health and safety principles.			[SU2] Assessment of ability to analyse information	
	[K7_W07] ma wiedzę o trendach rozwojowych i najistotniejszych nowych osiągnięciach dotyczącą zagadnień związanych z technologią materiałową i recyklingiem		is familiar with current development trends and the latest advances in materials technology and polymer recycling.			[SW1] Assessment of factual knowledge	
	[K7_K02] is aware of the importance of non-technical aspects and effects of engineering activities, including their impact on the environment and the associated responsibility for decisions made		is ready to assess the environmental impact of polymer recycling technologies and take into account the non-technical consequences of engineering activities and the responsibility associated with decision-making.			[SK2] Assessment of progress of work	
	[K7_W01] has extensive knowledge of technologies related to the production and management of waste from various material groups		has the necessary knowledge to analyze and evaluate technologies for the production and waste management of various material groups, taking into account material properties and the efficiency of the solutions applied.			[SW3] Assessment of knowledge contained in written work and projects	

Subject contents	Course content – lecture Regulations on polymer waste recycling. Types of waste and waste management options. Material identification and separation methods. Degradation processes of polymeric materials. Mechanical and chemical recycling technologies for polymers. Energy recovery from waste. Reuse of waste materials. Modern and innovative recycling technologies and their development trends. Environmental aspects and the circular economy.		
	Course content – laboratory Analysis of mechanical and chemical recycling processes for polymeric materials. Investigation of depolymerization processes and assessment of raw material recovery potential. Analysis of the effects of process parameters on recycling yield and the properties of the products obtained. Characterization and quality assessment of recycled materials. Process balancing and evaluation of material and energy efficiency. Analysis of the potential industrial applications of recycled materials and recycling product		
Prerequisites and co-requisites	Knowledge of production and chemical structure of main polymers; general knowledge of environmental protection.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture - written test	50.0%	60.0%
	Laboratory – completion of individual assignments.	100.0%	40.0%
Recommended reading	Basic literature	1) Praca zbiorowa pod redakcją A. Błędzkiego, Recykling materiałów polimerowych, WNT Warszawa 1997 2)Praca zbiorowa pod redakcją W. Parasiewicz, Elastomery, przemysł gumowy, IPG „Stomil” Piastów, ITPIB Politechniki Łódzkiej, Piastów – Łódź 2006 3) Praca zbiorowa pod redakcją A Prociak i in. Materiały poliuretanowe, PWN, Warszawa, 2014.	
	Supplementary literature	Poradnik „TWORZYWA SZTUCZNE W PRAKTYCE” 2007 Verlag Dashofer, Warszawa	
	eResources addresses		
	Example issues/ example questions/ tasks being completed	1. What are the advantages and limitations of modern polymer waste sorting methods? 2. What material-related and technological factors determine the choice of a recycling method for a specific polymer waste? 3. What properties of recycled materials should be evaluated to determine their potential for reuse?	
Practical activities within the subject	Not applicable		

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