GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Recycling of polymer materials, PG_00068312		
Field of study			
Date of commencement of studies	February 2026	Academic year of realisation of subject	2026/2027
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_W01] has extensive knowledge of technologies related to the production and management of waste from various material groups	has the necessery 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
[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

<table>
<tr><td>Subject contents</td><td>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</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Knowledge of production and chemical structure of main polymers; general knowledge of environmental protection.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Lecture - written test</td><td>50.0%</td><td>60.0%</td></tr>
<tr><td>Laboratory – completion of individual assignments.</td><td>100.0%</td><td>40.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>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, Pistów – Łódz 2006

3) Praca zbiorowa pod redakcją A Prociak i in. Materiały poliuretanowe, PWN, Warszawa, 2014.</td></tr>
<tr><td>Supplementary literature</td><td>Poradnik „TWORZYWA SZTUCZNE W PRAKTYCE” 2007 Verlag Dashofer, Warszawa</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td>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?</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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