



Subject card

Subject name and code	Material and Energy Recycling, PG_00064338						
Field of study	RECYKLING MATERIAŁOWY I ENERGETYCZNY						
Date of commencement of studies	February 2026		Academic year of realisation of subject			2026/2027	
Education level	second-cycle studies		Subject group			Optional subject group Specialty 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	1		Language of instruction			Polish	
Semester of study	2		ECTS credits			2.0	
Learning profile	general academic profile		Assessment form			assessment	
Conducting unit	Department of Energy Conversion and Storage -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Ewa Klugmann-Radziemska				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	0.0	30
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=737						
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		3.0		17.0	50
Subject objectives	The aim of the course is to familiarize students with issues related to waste management: principles of waste classification, segregation and management, basics of recycling technology for individual waste groups, environmental and economic aspects.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	[K7_W02] selects appropriate apparatus and materials for the manufacture and processing of consumer goods		The student selects appropriate equipment for waste processing.			[SW1] Ocena wiedzy faktograficznej	
	[K7_U09] prepares documentation of experiments and technological processes using professional terminology		The student prepares documentation of technological processes using professional terminology.			[SU4] Ocena umiejętności korzystania z metod i narzędzi	
	[K7_K01] critically evaluates the content of cognitive and practical problems		The student critically evaluates content relating to practical problems.			[SK5] Ocena umiejętności rozwiązywania problemów występujących w praktyce	

Subject contents	Course content – lecture		
	1. Waste. Waste management		
	2. EU directives and national regulations on waste management		
	3. Basics of proper functioning of the recycling system.		
	4. Material, raw material and energy recycling		
	5. Life cycle analysis of products (LCA)		
	6. 3/4R principle		
	7. Sustainable development principle		
	8. Practical aspects of waste management		
	9. Selective waste collection and its efficiency		
	10. Recycling and environmental protection		
	11. Selected recycling technologies: glass, vehicles, car tires, electronic equipment and photovoltaic modules		
	12. Product fee for packaging		
		Course content – project	
Students work on topics (to choose from) carried out in teams of 2 persons:			
1. Paper recycling			
2. Plastic recycling			
3. Metal recycling			
4. Hazardous waste recycling			
5. Battery recycling			
6. Glass recycling			
	7. Aluminum recycling.		
Prerequisites and co-requisites	NA		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Written test	60.0%	100.0%

Recommended reading	Basic literature	1. Ustawa o odpadach z dnia 14 grudnia 2012 (Dz.U.2022.699) https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/odpady-17940659 2. DYREKTYWA RADY 1999/31/WE z dnia 26 kwietnia 1999 r. w sprawie składowania odpadów https://sip.lex.pl/akty-prawne/dzienniki-UE/dyrektywa-1999-31-we-w-sprawie-skladowania-odpadow-67427597 3. Dyrektywa 2000/53/WE Parlamentu Europejskiego i Rady z dnia 18 września 2000 r. w sprawie pojazdów wycofanych z eksploatacji https://sip.lex.pl/akty-prawne/dzienniki-UE/dyrektywa-2000-53-we-w-sprawie-pojazdow-wycofanych-z-eksploatacji-67427581 4. Ustawa o recyklingu pojazdów wycofanych z eksploatacji (Dz.U. 2020 poz. 2056) https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20200002056 5. KOMUNIKAT KOMISJI Europejski Zielony Ład https://eur-lex.europa.eu/legal-content/PL/TXT/HTML/?uri=CELEX:52019DC0640&from=EN 6. Ustawa z dnia 13 czerwca 2013 r. o gospodarce opakowaniami i odpadami opakowaniowym https://sip.lex.pl/akty-prawne/dzu-dziennik-ustaw/gospodarka-opakowaniami-i-odpadami-opakowaniowymi-18015362
	Supplementary literature	1. Błędzki A.K., Recykling materiałów polimerowych, Wyd. Naukowo-Techniczne, Warszawa 1997 2. Wilczyński K. Reologia w przetwórstwie tworzyw sztucznych, Wyd. Naukowo-Techniczne, Warszawa 2001 3. Oprządkiewicz J., Technologie i systemy recyklingu samochodów, WNT Warszawa 2003 4. Czerwinski A., Akumulatory, baterie, ogniwa, Wydawnictwa Komunikacji i Łączności, Warszawa, 2005
	eResources addresses	
Example issues/ example questions/ tasks being completed	• Discuss the 3R and 4R principles. • What are some ways you can manage paper? • Principles for calculating the product fee. • Recycling glass packaging.	
Practical activities within the subject	Not applicable	

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