



Subject card

Subject name and code	Degradation and recycling of polymeric materials , PG_00057803						
Field of study	Green Technologies						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2026/2027		
Education level	first-cycle studies		Subject group		Optional 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	3		Language of instruction		English		
Semester of study	5		ECTS credits		3.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Polymer Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Justyna Kucińska-Lipka				
	Teachers		dr inż. Ewa Głowińska dr inż. Krzysztof Formela dr hab. inż. Michał Strankowski dr inż. Paulina Kosmela				
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	E-learning hours included: 0.0						
	eNauczanie source address: https://enauczanie.pg.edu.pl/2025/course/view.php?id=7762 Moodle ID: 7762 Degradation and recycling of polymeric materials https://enauczanie.pg.edu.pl/2025/course/view.php?id=7762						
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	45		2.0		28.0	75
Subject objectives	The aim of the course is to familiarize students with the degradation processes and recycling methods of polymeric materials						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W03] has a basic knowledge of soil, air and water pollutants, design and supervision of environmentally friendly technologies and technologies which do not produce waste, knows technology of cleaning and neutralization of industrial waste and wastewater management, has a basic understanding of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants	has the knowledge of soil, water, and air protection when planning measures to prevent the degradation of polymeric materials and to enable their subsequent recycling.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
	[K6_U05] can formulate and solve engineering tasks analytical methods, simulation as well as experimental, able to apply knowledge of basic physics and mathematics to analyze the results of experiments, is able to analyze and assess existing technical solutions	proposes and applies research methods for the characterization of polymer degradation processes.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
	[K6_U04] capable of formulating and solving design tasks in the field of environmental technology to recognize their non-technical aspects, including environmental, economic and legal. Is capable of applying the principles of occupational health and safety. Is able to make initial assessment of engineering solutions and actions	is able to apply the principles of best available techniques and the Sustainable Development Goals when carrying out polymer recycling processes	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU1] Assessment of task fulfilment
Subject contents	Course content – lecture		
	1. Introduction to polymer science 2. Processing of polymers 3. Introduction to polymer recycling 4. Chemical recycling of polymers 5. Atmospheric degradation of polymers 6. Biodegradation of polymers		
	Course content – laboratory		
	1. L1 Identification and separation of polymers 2. L2 Mechanical recycling of polymers 3. L3 Analysis of the physico-chemical properties of recycled polymers from L3 4. L4 Chemical recycling of polymers 5. L5 Thermal stability of polymers at oxidative and inert atmosphere 6. L6 Biodegradation of polymers		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture: Final test	60.0%	50.0%
	Laboratory course assessment (pre-test+raport).	60.0%	50.0%
Recommended reading	Basic literature	1. Szlezzyngier Włodzimierz , Brzozowski Zbigniew K., Tworzywa ogólnego zastosowania, Wydawnictwo Oświatowe FOSZE, 2013. 2. Praca zbiorowa pod redakcją A. Błedzkiego, Recykling materiałów polimerowych, WNT Warszawa 1997	
	Supplementary literature	1. https://onlinelibrary.wiley.com/doi/book/10.1002/9783527689002 2. https://www.sciencedirect.com/topics/engineering/polymer-degradation	
	eResources addresses		

Example issues/ example questions/ tasks being completed	1. Give 10 examples of thermoplastic polymers and their application. 2. Explain the difference between feedstock and mechanical recycling of polymers. 3. Give examples of biotic and abiotic factors involved in polymer degradation. 4. Explain the difference between aerobic and anaerobic biodegradation 5. What analytical methods are used to monitor the progress of polymer degradation?
Practical activities within the subject	Not applicable

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