GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Plastics in the 21st century: benefits, risks and challenges, PG_00069279						
Field of study	Chemical Technology						
Date of commencement of studies	February 2025		Academic year of realisation of subject	2025/2026			
Education level	second-cycle studies		Subject group				
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	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 inż. Marcin Włoch				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	0.0	0.0	15.0	45
	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	45	5.0	25.0	75

Subject objectives	The aim of the course is to familiarise students with various aspects (including non-technical ones) related to the development, production, use and recycling of plastics, including their impact on human life and health and the environment.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K7_K02] understands the non-technical aspects and implications of graduate activity, including the impact on the environment	The student understands the impact of plastics on the environment and on human health and life. The student understands that, like the use of other engineering materials, the impact of plastics on the environment and on human health and life can be both an effect and a consequence. The student is able to discuss the formation, detection and identification of microplastics in the environment and their impact on the environment.	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_W04] recognises scientific, technological, organisational and economic opportunities and constraints in technology and related fields	Students can discuss the possibilities and limitations of using plastics from a scientific, technological, organizational, legal, and economic perspective. Students can discuss plastic waste recycling and management technologies and identify the benefits of such activities. The student knows national and European legal regulations regarding the use of plastics (packaging) and the management of selected plastic waste.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
	[K7_K01] critically evaluates the content of cognitive and practical problems	The student is able to discuss and evaluate the benefits, risks and challenges arising from the use of plastics in everyday life, industry and special applications (medicine, aviation, construction, space science and others).	[SK5] Assessment of ability to solve problems that arise in practice
	[K7_W06] integrates knowledge from different disciplines, principles of intellectual property protection and patent law, relevant for appropriate interpretation and application in scientific, sustainable economic activities	Students can discuss the use of plastics in everyday life, industry, medicine, aviation, spaceflight, construction, environmental protection, and other areas. Students can identify and discuss the relationship between the production, use, and recycling of plastics and the principles and goals of sustainable development (e.g., Goal 9: Innovation, Industry and Infrastructure, Goal 12: Responsible Production and Consumption, Goal 14: Life Below Water).	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
	[K7_U07] takes into account ethical issues and regulations in research planning and product and process design	The student is able to discuss ethical problems and regulations in planning scientific research (e.g. research on materials for medicine) and designing products and technological processes (e.g. management and recycling of post-production and post-consumer waste, effective segregation of municipal waste) in the field of plastics.	[SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>Course content – lecture
• History of Polymers and Plastics
• Naturally Originated Polymers and Synthetic Polymers
• Plastics and the Sustainable Development Goals
• The Plastics Market in Poland and Europe
• Research and Development Projects in the Field of Plastics (including at the Department of Polymer Technology)
• Glass, Paper, and Aluminum Versus Plastics in Packaging
• The Contribution of Poles to the Development of Polymer and Plastics Science
• Plastics in Medical Applications Present Day and Expectations
• Plastics in Action Selected Applications
• "Beware of Accessories" Some Plastic Additions
• "The Second Life of Plastics" - Plastic Recycling
• A Real Challenge of the 21st Century: Microplastics. Formation, Research, and Health Risk
• Legal and Organizational Aspects of Plastic Waste Management in Poland
• "Plastic? Not Necessarily!" The European Union Strategy for Reducing Plastic Waste (Especially Single-Use Household Plastics)
• Other Topics Related to Plastics: According to the Interests of Course Participants

Course content – seminar
• Discussion on selected topics related to plastics in the 21st century
• Presentation of selected scientific publications on plastics</td></tr>
<tr><td>Prerequisites and co-requisites</td><td></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>Subtests (online)</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Presentation of a selected topic in the field of plastics</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Materials from the Plastics Europe Association, e.g., "Plastics: Over 100 Years of Innovation" [available at:] https://www.plasticseurope.org
2. H. Zawistowski: "The History of the Development of Plastics and Their Processing," Mechanick 82:7 (2009) 661-666
3. Materials from the Council of the European Union, e.g., "Waste Management and Recycling: The Council Adopts Rules" [available at:] https://www.consilium.europa.eu/pl/press/press-releases/2018/05/22/waste-management-and-recycling-council-adopts-new-rules/#
4. Selected Scientific and Popular Science Articles
5. Selected National and European Regulations and Laws</td></tr>
<tr><td>Supplementary literature</td><td>Other selected scientific and popular science articles</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>• Discuss and evaluate the European Union's strategy for reducing plastic waste / Discuss and evaluate Poland's strategy for recycling plastics.
• What applications of plastics in medicine do you consider most important and why? What research directions should be pursued in the coming years?
• Why are microplastics dangerous to the environment?
• Which three events in the history of plastics do you consider most important and why?
• Which Sustainable Development Goals address the broad design, use, and recycling of plastics?</td></tr>
<tr><td>Practical activites within the subject</td><td>Not applicable</td></tr>
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