



Subject card

Subject name and code	Environmental impact of modern technology, PG_00060780						
Field of study	Chemical Technology						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2029/2030		
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	4	Language of instruction			Polish		
Semester of study	7	ECTS credits			2.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Analytical Chemistry -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Bożena Zabiegała					
	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						
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	2.0		18.0	50	
Subject objectives	<p>The aim of the course is to increase awareness of the impact that modern technological processes have on the environment, as well as the possibilities for their modification and modernization. The course encourages students to analyse the economic and environmental costs and benefits resulting from technological improvements, the shift to green technologies and from their effects on ecosystems. An important component is also the discussion of the need to reconcile the interests of technology and the environment in decision-making processes.</p> <p>During the course, students learn methods for assessing the environmental impact of technologies, tools for reducing negative industrial effects, as well as modern concepts of the circular economy and pro-environmental solutions used in industry. They also develop skills in the conscious design and selection of technologies in accordance with the principles of sustainable development.</p>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_K04] Understands the non-technical aspects of the work of a chemical engineer, including the impact on the environment, and is aware of professionalism, professional ethics and respect for diversity.	is aware of the engineer's responsibility for the environment and human health, and is able to critically evaluate information about technologies and their claimed environmental impact (greenwashing).	[SK5] Assessment of ability to solve problems that arise in practice
	[K6_W02] Possesses the chemical knowledge necessary to synthesize, analyze and evaluate the properties of compounds and processes used in chemical technology.	knows the principles of conducting an environmental impact assessment of technologies and understands the mechanisms of transport, degradation, and bioaccumulation of new substances and materials (e.g., nanomaterials, biopolymers).	[SW3] Assessment of knowledge contained in written work and projects
	[K6_W03] Has knowledge in the field of chemical technology and environmental protection, including sustainable development, green chemistry, modern energy sources and the principles of minimizing the impact of industrial processes on the environment and work safety	knows the main directions of development of modern technologies and their potential impact on individual environmental components (water, soil, air, living organisms)	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
[K6_U05] Is able to make a preliminary economic evaluation of engineering solutions and apply knowledge of the humanities and social sciences to solve problems.	identifies and analyzes environmental pressures generated by chemical and related technologies and is able to prepare a proposal for modifying the technology to minimize environmental burdens.	[SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task	
Subject contents	<p>Course content – lecture</p> <p>The course covers issues related to sustainable development as well as the types of environmental pressures generated by technologies, including emissions, waste, noise, light and EMF pollution, and resource consumption. It discusses EU regulations concerning technologies, the environmental impact of modern technologies including nanotechnology, advanced materials, energy technologies, biotechnology, and recycling processes. Students learn methods for assessing the environmental impact of technologies, such as LCA, SEA, ecological risk and toxicity assessment, as well as designing processes to minimize environmental burden.</p> <p>Course content – project</p> <p>Project</p> <ol style="list-style-type: none"> 1. Analysis of the environmental impact of a selected technology 2. Identification and assessment of environmental risk for a selected substance or material 3. Modernization of technological process towards a circular economy 4. Case study: comparison of two alternative technologies from an environmental perspective 5. Presentation and defense of a group project 		
Prerequisites and co-requisites	Fundamental knowledge of environmental, analytical, and physical chemistry, as well as knowledge in the field of chemical technology and unit operations		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Lecture: Written test	60.0%	50.0%
	Participation and engagement	0.0%	10.0%
	Environmental project + presentation	60.0%	40.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Wysokińska Z., <i>Zrównoważony rozwój i zielona gospodarka</i>. 2. Anastas P., Warner J., <i>Green Chemistry: Theory and Practice</i>. 3. Ustawa Prawo Ochrony Środowiska; wytyczne BAT. 	
	Supplementary literature	<ol style="list-style-type: none"> 1. ISO 14040/14044 LCA. 2. Czasopismo RSC Sustainability. 3. Czasopismo - <i>Journal of Cleaner Production, Environmental Science: Processes & Impacts</i>. 4. Czasopismo - <i>Green Chemistry</i> 5. Czasopismo - <i>ACS Sustainable Chemistry and Engineering</i> 6. Raporty środowiskowe ECHA, EEA (przykłady studiów przypadków). 	
	eResources addresses		
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. Low-emission and negative-emission technologies, CCS/CCU, Carbon Capture and Storage/Carbon Capture and Utilization, DAC- Direct Air Capture 2. Case studies of green chemical technologies 3. Greenwashing identification and verification of actual environmental impact 		
Practical activities within the subject	Not applicable		

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