



## Subject card

Subject name and code	, PG_00066273						
Field of study	Recycling and Energy Recovery						
Date of commencement of studies	October 2024		Academic year of realisation of subject		2025/2026		
Education level	first-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	4		ECTS credits		10.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry -> Faculties of Gdańsk University of Technology						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Jacek Gębicki				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	0.0	100.0	0.0	100
	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	100		0.0		0.0	100
Subject objectives	The aim of the course is to familiarize students with the main aspects of the operation of thermal waste treatment plants, such as cogeneration of heat and electricity and the management of slag and ash after the combustion and exhaust gas purification processes.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_K01] makes decisions independently, conducts a critical assessment of his own actions and the actions of the teams he manages, assuming responsibility for the effects of these actions.		The student is able to critically evaluate their own teamwork, as well as that of the team in which they perform tasks. The student is able to report the results of their own and the team's work.		[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice		
	[K6_U03] designs processes, technologies and systems related to the recovery of raw materials and energy, using appropriate concepts, standards and design methods.		The student is able to design basic technologies related to the recovery of raw materials and energy and propose methods for analyzing the obtained results.		[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	[K6_U05] plans, prepares and conducts engineering activities in the field of raw materials and energy recovery, applying practical knowledge and understanding of the specificity of materials, devices and tools, processes and technologies.		The student is able to carry out engineering tasks using practical knowledge in the field of raw materials and energy recovery.		[SU3] Assessment of ability to use knowledge gained from the subject		
	[K6_W03] identifies problems and phenomena related to the recovery of raw materials and energy as well as applicable concepts, standards and design methods and is aware of their limitations.		Students can identify and interpret problems related to resource and energy recovery processes. Furthermore, they can plan solutions based on acquired theoretical and practical knowledge.		[SW3] Assessment of knowledge contained in written work and projects		
	[K6_K02] cooperates with other people in the implementation of teamwork, both as a leader and a team member, effectively achieving the assumed goals.		The student applies the principles of functioning in a group and is able to carry out assigned tasks both individually and in a team.		[SK1] Assessment of group work skills [SK2] Assessment of progress of work		

Subject contents	Course content – project 1. Introduction to the ITPOK (Incineration and Waste Treatment Plant) the importance of municipal waste incineration plants in the waste management system, basic concepts and definitions. 2. Legal framework national and EU regulations regarding the operation of waste incineration plants; environmental requirements, emission standards. 3. Waste incineration plants in Poland an overview of operating installations, location, technical parameters, energy efficiency, and social aspects. 4. Thermodynamics of the combustion process the water-steam cycle in the incineration plant, energy balances, and electricity and heat generation in cogeneration. 5. Monitoring and measurement systems methods for controlling incineration plant operating parameters: pollutant emission measurements, measurements of water-steam cycle parameters (temperature, pressure, flow), measurements of water quality parameters in the cycle (pH, conductivity, oxygen content). 6. Flue gas treatment technologies methods for removing sulfur oxides, nitrogen oxides, heavy metals, and dioxins; exhaust gas treatment systems in waste incineration plants. 7. Management of waste slag and ash.		
Prerequisites and co-requisites	Theoretical knowledge of combustion processes - conditions, temperature range  Waste classification - energy waste  Air purification methods  Basic information about cogeneration		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	colloquium summarizing the classes	60.0%	50.0%
	oral presentation	60.0%	25.0%
	project - 2 tasks	100.0%	25.0%
Recommended reading	Basic literature		1. W. Lewandowski - Techniczno-technologiczne i aparaturowe aspekty ochrony powietrza, Wydawnictwo PG, Gdańsk 2011.  2. J. Piotrowski - Pomiary, Wydawnictwo WNT, Warszawa 2012.
	Supplementary literature		PG library resources plus trade magazines such as: Przegląd Komunalny
	eResources addresses		
	1. List the methods of flue gas desulfurization.  2. Describe the advantages and disadvantages of dry and wet dust removal.  3. Principle of operation of a Venturi scrubber.  4. Energy efficiency - how to calculate it?		
Practical activities within the subject	Not applicable		

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