



## Subject card

Subject name and code	Waste management and waste disposal, PG_00048773						
Field of study	Green Technologies						
Date of commencement of studies	October 2020		Academic year of realisation of subject		2022/2023		
Education level	first-cycle studies		Subject group		Obligatory subject group in the field of study 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	6		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		exam		
Conducting unit	Department of Colloid and Lipid Science -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Aneta Pacyna-Kuchta				
	Teachers		dr inż. Aneta Pacyna-Kuchta				
			dr inż. Ilona Kłosowska-Chomiczewska				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	15.0	60
	E-learning hours included: 0.0						
	Address on the e-learning platform: <a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22273">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=22273</a>						
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	60		15.0		50.0	125
Subject objectives	The aim of the course is to present various aspects and information about waste such as waste management policy, types of waste, collection, segregation and disposal methods.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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	Student is able to undertake discussion concerning waste management, and to present his point of view. He/she is consistent in realization of his/her tasks, updates the knowledge on the newest solutions in the scope of waste management and disposal, understands the need of updating the knowledge in this field. Student knows and can apply basic rules of safety and hygiene of work applicable in environmental technologies. The student has basic knowledge about design of environmentally friendly technologies and basic analytical methods.	[SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools [SU5] Assessment of ability to present the results of task
	[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	Student has basic knowledge about environmentally friendly technologies and wasteless technologies. He or she has knowledge about currently applied solutions in the field of waste management, especially in European Union.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation
	[K6_K02] is aware of the social role of a technical college graduate, take the reflections on the ethical, scientific and social aspects of the work performed, understands the need to promote, formulating and providing the public with information and opinions concerning the activities of the profession of engineer.	The student is able to use properly selected methods and equipment that enable to measure basic quantities characterizing technological processes and the environment. The student can apply knowledge essential to understand social, economic, legal and other non-technical conditions of engineering activities. He/she can use the obtained knowledge to modify existing solutions used in environmental protection.	[SK4] Assessment of communication skills, including language correctness [SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work
Subject contents	Lectures: Legal aspects of municipal solid waste management. Legal regulations of waste management in Poland and EU. Waste classification, definitions. Municipal waste: characteristics, quantity and quality. Segregation. Recycling. Storage of waste in municipal waste landfills. Main design and operational requirements for municipal waste landfills. Physical, chemical and biological processes occurring during waste disposal Biogas recovery. Problems of leachate from landfills characteristics, methods of treatment.Composting of organic waste. Process conditions, classification of compost. Methods of composting.Thermal waste utilization methods. Pyrolysis and combustion. Co-incineration with the addition of solid fuels.Methane fermentation of organic waste. Process conditions, fermentation methods. Utilization and recovery of economically important raw materials, e-waste.Seminar: Presentation of selected waste management problems, student project on waste management issuesLaboratories: Methane fermentation, composting, landfill leachate analysis		
Prerequisites and co-requisites	Knowledge of general chemistry and environmental chemistry concepts and definitions. Knowledge of chemical technology.technology. Knowledge of health and safety regulations and laboratory work rules.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Seminar	60.0%	20.0%
	Lectures- written exam	60.0%	60.0%
	Laboratories	60.0%	20.0%
Recommended reading	Basic literature	Martin W.F., Lippitt J.M., Webb P.J. Hazardous Waste Handbook for Health and Safety, Butterworth, Heinemann, 2000.	
	Supplementary literature	1.Masters G.M. Introduction to Environmental Engineering and Science, Prentice-Hall inc. London, 1991.2.Librizzi W.J., Lowery C.N., Hazardous Waste Treatment, Wat. Poll. Contr. Fed., Virginia 1990.3.Maughan J., Ecological assessment of hazardous waste sites, VRN, New York, 1993.4.Cheremisinoff N.P., Biotechnology for waste and wastewater treatment, Noyes Publikations, 1996.	
	eResources addresses	Adresy na platformie eNauczanie:	
Example issues/ example questions/ tasks being completed	1. Describe what physical, biological and chemical transformations solid waste can undergo. 2. What physicochemical properties of waste are important for the waste management? Explain why. Describe the method of determination of two selected properties.		
Work placement	Not applicable		