GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	, PG_00062855		
Field of study	Recycling and Energy Recovery		
Date of commencement of studies	October 2023	Academic year of realisation of subject	2023/2024
Education level	first-cycle studies	Subject group	
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish lack
Semester of study	2	ECTS credits	10.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Process Engineering and Chemical Technology -> Faculty of Chemistry		
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Jacek Gębicki	
	Teachers	dr hab. inż. Jacek Gębicki dr inż. Piotr Rybarczyk dr inż. Karolina Kucharska dr inż. Natalia Łukasik Ewelina Pawelczyk dr inż. Aleksandra Małachowska dr inż. Bartosz Szulczyński	

Lesson types and methods of instruction	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	10.0	140.0	250

Subject objectives	The aim of the course is to implement a technological project related to the management of waste from the organic fraction. The project implementation will consist of the following tasks: 1. morphological assessment of mixed waste for methane fermentation 2. energy assessment of mixed waste for incineration 3. assessment of the quality of compost and stabilizer from organic waste 4. assessment of the spread of odors from compost and stabilizer piles 5. preparation of an ecological report - legal legislation on odors in Poland.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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 a process related to the recovery of energy and raw materials using appropriate design methods	[SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools
[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 acquires practical knowledge and skills in planning and implementing activities in the field of energy and raw material recovery engineering	[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.	The student is able to identify problems related to the recovery of raw materials and energy and is aware of their limitations	[SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation
[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 is able to work in a team and effectively carries out assigned tasks	[SK3] Assessment of ability to organize work [SK1] Assessment of group work skills
[K6_K04] effectively, clearly and unambiguously communicates information, describes activities and communicates their results/ outcomes to engineers or the wider public using appropriate communication methods and tools.	The student is able to effectively convey the acquired information about the acquired technology to the recipient using communication methods and tools	[SK4] Assessment of communication skills, including language correctness

Subject contents

1. morphological assessment of mixed waste for methane fermentation

Isolation of the organic fraction from mixed waste, determination of the percentage of this fraction in the total washed sample. Carrying out methane fermentation and determining the yield of methane obtained from 1 kg of mixed waste.

2. energy assessment of mixed waste for incineration

Isolation of the energy fraction from mixed waste, determination of the percentage of this fraction in the total washed sample. Conducting calorimetric measurements to estimate the energy value of the isolated fraction.

3. assessment of the quality of compost and stabilizer from organic waste

Learning about the technology of producing compost and stabilizer, carrying out measurements of the AT4 parameter

4. assessment of the spread of odors from compost and stabilizer piles

Learning the methods of measuring the level of odor concentration, measurements using olfactometers, learning the methods of spreading odorants using simulation models

5. preparation of an ecological report - legal legislation on odors in Poland.

Preparation of a shortened version of the ecological report regarding odor nuisance off-site

Prerequisites and co-requisites

General knowledge about ecology, waste storage, biogas production and waste segregation

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Oral presentation	60.0%	30.0%
Design	60.0%	70.0%

Recommended reading	Basic literature	1. Odory, Joanna Kośmider i in., PWN, Warszawa, 2002 2. Resources of the GUT Library - especially waste management
	Supplementary literature	Not applicable
	eResources addresses	Podstawowe https://pg.edu.pl/biblioteka-pg/e-zasoby/bazy-danych - List of databases and resources of magazines and books of the GUT library Adresy na platformie eNauczanie: Projekt technologiczny-zagospodarowanie odpadów z frakcji organicznej - Moodle ID: 38692 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=38692
Example issues/ example questions/ tasks being completed	1. Calculate the odor concentration if a Nasal Ranger field olfactometer was used for measurements and the sample dilution was 4. 2. Odor intensity depends on the odor concentration, calculate the level of odor intensity if the odor concentration is 30 ou/m3. Use the following data to estimate odor intensity: odor intensity - 2, odor concentration 15 ou/m3 odor intensity - 3 odor concentration 45 ou/m3 odor intensity - 5 odor concentration 150 ou/m3 3. Calculate the odor concentration if three people measured the odor concentration using a Nasal Ranger field olfactometer and reported no perceived odor at dilutions of 4, 7, 15, respectively.	
Work placement	Not applicable	

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