



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Methods for the removal of contaminants from municipal waste [S2TOZ1-RMiOC>MUZzOK]

### Course

Field of study

Circular System Technologies

Year/Semester

1/1

Area of study (specialization)

Material recycling and chemical recovery

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

1,00

### Coordinators

dr hab. inż. Katarzyna Dopierala

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### Lecturers

### Prerequisites

**Knowledge:** The student possesses basic knowledge in the fields of general and physical chemistry, polymer technology, and has an understanding of the unit operations carried out during the processing and disposal of waste, with particular emphasis on the implementation of the circular economy. Additionally, the student has a fundamental understanding of chemical engineering principles. **Skills:** The student is capable of analyzing technical documentation and has basic skills in designing process equipment. The student is able to acquire and expand knowledge related to the circular economy by utilizing various sources. **Social Competences:** The student understands the necessity of continuously improving their skills and recognizes the need to enrich the knowledge gained during their studies.

### Course objective

The aim of the course to learn the methods of removing contaminants from municipal waste prior to recycling.

### Course-related learning outcomes

**Knowledge:**

-The student possesses advanced knowledge enabling them to design technological processes based on

the principles of the circular economy (K\_W07).

-The student has advanced knowledge of material recycling methods, raw material recovery, and energy recovery from waste materials, necessary for process design (K\_W12).

Skills:

-The student is able to identify and critically evaluate technical solutions in waste recycling in accordance with the principles of the circular economy (KU\_04).

-The student has the ability to select recycling methods, chemical recovery, and disposal techniques for various types of waste, and to formulate assumptions necessary for designing innovative solutions based on the principles of the circular economy (KU\_10).

-The student can analyze and critically assess new areas in circular economy technologies and related fields, evaluating their innovation and technical feasibility (K\_U16).

Social competences:

-The student critically assesses their own knowledge and understands the need for further education and the development of their professional, personal, and social competences (K\_K03).

-The student is capable of thinking and acting in an entrepreneurial manner, while being aware of their social role and the public interest (K\_K04).

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The final assessment will be in written form, consisting of multiple-choice, open, and mixed questions, along with participation in discussions during classes. The final grade is determined based on the result of a scored test, graded on a scale of 0-50 points. Participation in discussions can earn up to 5 additional points. The final grade is determined according to the following criteria:

51-60%: 3,0

61-70%: 3,5

71-80%: 4,0

81-90%: 4,5

>90%: 5,0

### Programme content

The course content covers issues related to the removal of contaminants from municipal waste (plastics, metals, glass, and other materials) as a stage in the recycling process.

### Course topics

-Introduction to municipal waste recycling

-Composition and physicochemical properties of municipal waste

-Physicochemical principles of washing processes (wetting, solubilization, emulsification, dispersing)

-Surfactants for removing contaminants from waste

-Removal of contaminants from plastic waste

-Removal of contaminants from metal and glass waste

-Water and wastewater management in the process of removing contaminants from municipal waste

-Modern technologies and sustainable practices in waste washing

### Teaching methods

Lecture illustrated with a multimedia presentation and group discussion

### Bibliography

Basic:

1. R. Zieliński, Surfaktanty. Budowa, właściwości, zastosowania. Wyd. Uniwersytetu Ekonomicznego w Poznaniu, Wyd. IV, Poznań 2021

2. P. Szumała, Charakterystyka i zastosowanie związków powierzchniowo czynnych w produktach detergentowych, Wyd. Politechniki Gdańskiej, Gdańsk 2024

3. Praca zbiorowa, Nowoczesne technologie recyklingu materiałowego, Wyd. Politechniki Gdańskiej 2017

Additional:

1. R. Chandrappa, D.B. Das, Solid waste management. Principles and Practice. Wyd. 2, Springer 2024
2. K. Dopierala, K. Prochaska, Dynamics of Adsorption in Micellar and Non Micellar Solutions of Derivatives of Lysosomotropic Substances. Advances in Colloid and Interface Science. 22, 2010, 62-69. <https://doi.org/10.1016/j.cis.2010.02.008>.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	15	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	10	0,50