



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Industrial Waste Solids Management

### Course

Field of study

Environmental Engineering

Area of study (specialization)

Water Supply, Water Soil Protection

Level of study

Second-cycle studies

Form of study

part-time

Year/Semester

2 / 3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

14

Laboratory classes

Tutorials

10

Projects/seminars

16

Other (e.g. online)

### Number of credit points

4

### Lecturers

Responsible for the course/lecturer:

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Energy

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Responsible for the course/lecturer:



## Prerequisites

### 1. Knowledge:

Basic knowledge about chemistry, environmental biology, ecology and general knowledge from environmental engineering.

### 2. Skills:

Ability for searching valuable information. Reading research articles and reports with understanding. Ability to use existing knowledge and its application in a new perspective. Basic principles of working in a group and writing a project reports.

### 3. Social competencies:

Awareness to constantly update and supplement knowledge and skills.

## Course objective

The course is dealing with problems concerning waste management of solid wastes and their utilization. The objective of the course is to develop skill on waste management planning, waste segregation, mechanic-, thermal- and biological- treatment, and landfilling of waste.

## Course-related learning outcomes

### Knowledge

1. Student has structured and theoretically founded knowledge of the existing waste management systems. - [KIS2\_W05; KIS2\_W06; KIS2\_W07; KIS2\_W08; ]
2. Student has structured and theoretically founded knowledge in terms related to the generation of waste: waste source, waste types, fractions of waste segregation at the source. - [KIS2\_W05; KIS2\_W06; KIS2\_W07; KIS2\_W08; ]
3. Student knows and understands the role of properly designed waste management systems. - [KIS2\_W05; KIS2\_W06; KIS2\_W07; KIS2\_W08; ]
4. Student knows and understands the consequences of wrongly designed waste management systems. - [KIS2\_W05; KIS2\_W06; KIS2\_W07; KIS2\_W08; ]
5. Student knows and understands the basic technologies used in waste management systems and wpływ źle zaplanowanego systemu gospodarki odpadami przemysłowymi- [KIS2\_W05; KIS2\_W06; KIS2\_W07; KIS2\_W08; ]

### Skills

1. Student is able to plan waste management system in accordance with the demand in the region. - [KIS2\_U05; KIS2\_U06; KIS2\_U08; KIS2\_U09; KIS2\_U13; ]
2. Student is able to design and explain the system of collection, transport and transfer of waste. - [KIS2\_U05; KIS2\_U06; KIS2\_U08; KIS2\_U09; KIS2\_U13; ]



3. Student can describe the waste treatment technologies and explain the associated physical, chemical and biological processes. - [KIS2\_U05; KIS2\_U06; KIS2\_U08; KIS2\_U09; KIS2\_U13; ]
4. Student can describe recycling technologies for important fractions of waste. - [KIS2\_U05; KIS2\_U06; KIS2\_U08; KIS2\_U09; KIS2\_U13; ]
5. Student can describe the waste disposal technologies and explain the associated physical, chemical and biological processes and important aspects related to resource use and emissions associated with the collection, treatment, recycling and disposal of waste, and describe their impact on the environment. - [KIS2\_U05; KIS2\_U06; KIS2\_U08; KIS2\_U09; KIS2\_U13; ]

#### Social competences

1. Student understands the need for teamwork in solving theoretical and practical problems. - [KIS2\_K01; KIS2\_K02; KIS2\_K03; ]
2. Student understands the different roles in a teamwork and the need for information and knowledge exchange in a group work. - [KIS2\_K01; KIS2\_K02; KIS2\_K03; ]
3. Student is aware of the need for sustainable development in waste management systems. - [KIS2\_K01; KIS2\_K02; KIS2\_K03; ]
4. Student understands the need for a systematic deepening and broadening his/her competences. - [KIS2\_K01; KIS2\_K02; KIS2\_K03; ]

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- written exam, minimum 50% points required.

Tutorials:

- presentation in English concerning waste management for selected industry, minimum of 50% points required

Project:

- presentation of the results, minimum of 50% points required.

#### Programme content

Basic concepts of waste management: waste generation, the amount and composition, collection and segregation of waste, recycling and reuse, incineration, biological treatment (composting, biogas production), waste disposal, waste management regulations, the impact of waste on the environment.

Projects:



Students will be divided into groups of about 4-6 (depending on the number of students in groups) within which they will work on solving the waste management problem for specific town/city based on the knowledge acquired from the lectures and literature. Additionally, the following soft skills will be acquired: working in groups, sharing tasks, searching for valuable information, writing reports, presenting the results.

### Teaching methods

Informative and interactive lecture, lecture with multimedia presentation, problem and activating lecture. Exercises: exercise, problem method, case study, teamwork, problem solving, data interpretation

### Bibliography

#### Basic

1. Rosik-Dulewska Cz. (2011): Podstawy gospodarki odpadami, Wydawnictwo Naukowe PWN, Wydanie piąte uaktualnione (ISBN 978-83-01-16353-2)
2. Christensen T. H.: Solid waste technology &#38;#38;#38; Management. Wiley Blackwell Publishing Ltd., 2011, ISBN 9781405175173.

#### Additional

1. A. Laurent, I. Bakas, J. Clavreul, A. Bernstad, M. Niero, E. Gentil, M. Z. Hauschild, T. H. Christensen: Review of LCA studies of solid waste management systems ? Part I: Lessons learned and perspectives. Waste Management 34 (2014) 573?588.
2. A. Laurent, J. Clavreul, A. Bernstad, I. Bakas, M. Niero, E. Gentil, T. H. Christensen, M.Z. Hauschild: Review of LCA studies of solid waste management systems ? Part II: Methodological guidance for a better practice. Waste Management 34 (2014) 589?606.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	40	1,5
Student's own work (literature studies, preparation for tutorials, preparation for tests, project preparation) <sup>1</sup>	60	2,5

<sup>1</sup> delete or add other activities as appropriate