



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Structure of circular systems economy

### Course

Field of study

Circular system technologies

Area of study (specialization)

-

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

### Number of hours

Lecture

15

Tutorials

0

Laboratory classes

0

Projects/seminars

0

Other (e.g. online)

0

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

dr hab. en. Sławomir Borysiak, prof. of PUT

Faculty of Chemical Technology of the Poznań  
University of Technology

Lecture Center of the Faculty of Chemical  
Technology,

Address: Berdychowo 4 str., 60-965 Poznań

phone: 61 665-3549

email: slawomir.borysiak@put.poznan.pl

Responsible for the course/lecturer:

dr eng. Łukasz Ławniczak

Faculty of Chemical Technology of the Poznań  
University of Technology

Lecture Center of the Faculty of Chemical  
Technology,

Address: Berdychowo 4 str., 60-965 Poznań

phone: 61 665-3749

email: lukasz.lawniczak@put.poznan.p



### Prerequisites

At the beginning of the course, the student should possess basic, general knowledge regarding the raw materials used for industrial production in Poland and in the world. In addition, the student should be aware of the need to develop their competences and understand the issues associated with the impact of raw materials processing technology on the environment.

### Course objective

To provide students with knowledge regarding the structure of the circular systems economy, including technical and biological cycles. To familiarize students with the general aspects of waste management, with the essence of waste recycling technology in selected sectors of the economy as well as technologies using renewable resources.

### Course-related learning outcomes

#### Knowledge

K\_W05 - has knowledge regarding the development of ideas, goals, principles of operation and the organizational structure of the circular systems economy; knows the market, economic and legal-administrative aspects of its functioning along with their interrelationships (P6S\_W).

K\_W10 - has knowledge regarding raw materials, products and processes used in closed-loop technologies (P6S\_WG).

K\_W13 - has the knowledge to describe the basic development trends related to circular system technologies (P6S\_WG).

#### Skills

K\_U04 - has the ability to self-educate, is able to use information sources in Polish and in a foreign language in accordance with the principles of ethics, reads with understanding, conducts analyzes, syntheses, summaries, critical assessments and correct conclusions (P6S\_UU).

K\_U07 - is able to participate in the debate by presenting and evaluating opinions on the circular system technology (P6S\_UK).

K\_U15 - based on the acquired knowledge, can develop an independent or team project/report regarding the performed work and prepare a multimedia presentation (P6S\_UW).

#### Social competences

K\_K05 - objectively assesses the level of knowledge and skills, understands the importance of improving professional and personal competences adequately to the changing social conditions and the progress of science (P6S\_KK).

K\_K06 - thinks and works in an entrepreneurial way (P6S\_KO).

K\_K09 - supports the idea of harmonious, global civilization and economic development, promoting the principles of circular system economy, sustainable development and rational management of natural environment resources on a local and global scale (P6S\_KO, P6S\_KK, P6S\_KR).



### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Evaluation in stationary mode:

Written test with 7 closed questions and 3 open questions.

Evaluation in on-line mode:

Test with 7 closed questions and 3 open questions carried out with the use of the eKursy platform.

A passing grade is obtained when the number of points is greater than 50% of the accepted maximum.

### Programme content

Introduction to waste management. Threats caused by improper waste management. Pollution of ecosystems. The impact of waste on ecosystems.

Regulations and directives concerning the management and recycling of waste. Main goals and trends. Analysis of waste production and consumption in Poland, Europe and the world.

Principles of sustainable resource management. The 3/4/5 Rule. Whole Product Life Cycle Analysis (LCA). Waste management.

Circular economy model (main assumptions, technical and biological cycles).

The issues of waste recycling at the stage of design, production and use.

Sustainable industrial production - sources of industrial waste, producer responsibility, waste-free technologies.

Municipal waste - sources of origin, types, methods of management, monitoring and municipal waste management.

Circular bioeconomy. Biomass and renewable resources. Biodegradable and compostable waste.

Examples of use of the latest technological solutions in material recycling of municipal and troublesome waste.

Examples of innovative technological solutions in the use of renewable resources.

Moreover, as part of the lectures, meetings with representatives of various industrial sectors are planned in order to familiarize students with the practical aspects related to circular system technologies.

### Teaching methods

The lecture includes a multimedia presentation of the discussed content and involving students in discussions.



Meetings with representatives of the economic sector that employ circular system technologies.

## Bibliography

### Basic

1. Rynek pracy a gospodarka o obiegu zamkniętym w Europie: studium możliwości we Włoszech, Polsce i Niemczech, Seria wydawnicza IBS PW NR 4/2016.
2. Mapa Drogowa: Transformacji w kierunku gospodarki o obiegu zamkniętym, Załącznik do uchwały nr Rady Ministrów z dnia 2019 r.

### Additional

1. Komunikat komisji do parlamentu europejskiego, rady, europejskiego komitetu ekonomiczno-społecznego i komitetu regionów: Zamknięcie obiegu - plan działania UE dotyczący gospodarki o obiegu zamkniętym, Bruksela, dnia 2.12.2015 r.
2. Komunikat komisji do parlamentu europejskiego, rady europejskiej, rady, europejskiego komitetu ekonomiczno-społecznego i komitetu regionów: Nowa strategia przemysłowa dla Europy, Bruksela, dnia 10.3.2020 r.
3. Komunikat komisji do parlamentu europejskiego, rady, europejskiego komitetu ekonomiczno-społecznego i komitetu regionów: Nowy plan działania UE dotyczący gospodarki o obiegu zamkniętym na rzecz czystszej i bardziej konkurencyjnej Europy, Bruksela, dnia 11.3.2020 r.

## Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	16	0,5
Student's own work (literature studies, preparation for tests/exam) <sup>1</sup>	9	0,5

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