COURSE DESCRIPTION CARD - SYLLABUS

Course name
Selected material and chemical recycling technologies [S2TOZ1>WTRMiC]

Course

Field of study
Circular System Technologies

Year/Semester
1/1

Area of study (specialization)
Renewable raw material technologies

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
30

Laboratory classes
0

Other
0

Tutorials
15

Projects/seminars
15

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

A student has basic theoretical systematic knowledge of general in the field of circular economy, also including the key issues related to technological processes used in material recycling, recovery of raw materials and energy. A student has the ability to assess the technological suitability of waste materials and their qualifications in relation to product quality requirements. A student is able to obtain information from literature, databases and other sources, also in English, as well as interpret the obtained data, draw conclusions and formulate and justify opinions.

Course objective

Expanding knowledge in the field of modern technologies used in the circular economy, enabling students to combine their theoretical knowledge with the experience of representatives of the economic environment provided during lectures. Deepening students' knowledge in the field of methods of conducting real technological processes concerning material recycling, recovery of raw materials and energy, as well as learning about problems occurring during the implementation of such processes, ways of reacting and solving them. Learning about technological installations in the area of the circular economy through direct visits to selected industrial units.

Course-related learning outcomes

Knowledge:
1. A student has broad and deep theoretically knowledge of modern technologies for material and chemical recycling currently used in the circular economy [K_W05].
2. A student has in-depth knowledge necessary to design technological processes for material and chemical recycling based on the principles of circular economy [K_W07].
3. A student has advanced, detailed knowledge covering issues related to sustainable production, taking into account the principles applicable in the circular economy [K_W03].

Skills:
1. A student has the skills to use the knowledge acquired to indicate and select methods of recycling and recovering raw materials from waste materials, as well as to indicate methods of managing various industrial wastes, taking into account the principles of circular economy [K_U03].
2. A student is able to plan, prepare and present a presentation on the implementation of a research task related to the issues of circular economy and conduct a substantive discussion [K_U02].
3. A student has the ability to communicate verbally with specialists in the area of circular economy, along with the ability to verify existing engineering solutions [K_U01]

Social competences:
1. A student understands the need to popularize knowledge in the field of sustainable production, environmental protection and technological solutions for material and chemical recycling [K_K02].
2. A student is aware of the personal responsibility resulting from the professional role performed and the emergence of moral and ethical problems in the context of activities related to environmental protection and the implementation of the assumptions of the circular economy.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired during the lecture is verified in the form of test after the end of the lecture cycle. The colloquium consists of 20-30 questions (test and open-ended - an average of 2 questions from each lecture). Passing threshold: 50% of points. The issues for the assessment, based on which the questions are developed, will be sent to students by e-mail using the university e-mail system. In the case of lectures conducted remotely, the colloquium will take place on-line using the university infrastructure.
Skills in project classes are verified based on the completion of a project task, which is submitted electronically. Additionally, a multimedia presentation presented during the class, during which the design assumptions are discussed, is assessed. In the case of classes conducted remotely, the presentation and discussion will take place online using the university infrastructure.
Knowledge acquired during the exercises is verified during discussions on issues and problems presented during visits to industrial units. Additionally, a written work on solving selected technological problems inspired and specified by the Trainer during working visits to industrial units is assessed.

Programme content

The lectures cover various topics related to material recycling and chemical recovery of waste materials from various industries (electrical and electronic, packaging, automotive, construction, plastics and others). The lectures will also present issues related to the analysis of production, processing and management of waste materials in Poland, Europe and the world according to the latest assumptions of the circular economy. Each lecture is conducted by various representatives of industrial units, who, having extensive practical experience, will present the latest solutions in technologies supporting the circular economy.

Course topics

The topics of the lectures will be determined at a later date after consultation with invited lecturers from selected industrial units.
The exercises will be carried out in the form of visits to selected industrial units, within which students will learn about the latest technological solutions including material and chemical recycling. During the visits, a discussion part will also be selected, in which practitioners will present the problems occurring during production, and in particular aspects related to the assumptions of the circular economy. The essence of this form of classes is to confront the theoretical knowledge of students with real problems occurring in the circular economy.

The project classes include tasks related to designing a technological solution covering the management of waste materials through the use of material or chemical recycling. The main aspects discussed necessary to carry out the design procedure are: the criterion of qualification of waste materials for a given recycling method, selection of a waste material processing technique, selection of modifying agents, selection of necessary equipment for the production of recyclates, conducting an overall economic balance of the recycling process. Carrying out the project task.

Teaching methods

1. Lecture: multimedia presentation
2. Exercises: visits to industrial units. Exercises consist of observing technological processes in real conditions combined with discussion and solving selected problems covering the area related to the circular economy. Deductive method.
3. Project: materials necessary during design - brochures, databases of raw materials and modifying additives, catalogs of machines and devices together with the characteristics of parameters for designing technological lines related to material and chemical recycling.

Bibliography

Basic:
Determined directly by the lecturer.

Additional:
Determined directly by the lecturer.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	60	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,50