COURSE DESCRIPTION CARD - SYLLABUS

Course name
Unit operations in the processing of raw materials and waste [S1TOZ1>OJwPSiO]

Course

Field of study
Circular System Technologies

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-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

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Lecturers

Prerequisites

The student starting the course: has a basic knowledge of mathematics, physics, chemistry, construction of process apparatus, chemical engineering, and the basics of fluid mechanics acquired during the first degree classes, enabling understanding and interpretation of phenomena and processes occurring during the implementation of individual unit operations; is able to acquire and supplement information from academic textbooks and other books; has the ability to self-study; understands the need for continuous training and setting ambitious goals on the way to achieving higher education.

Course objective

Presentation of basic information on unit operations performed during the output and processing of raw materials as well as the processing and disposal of waste, with particular emphasis on the implementation of the closed-loop of raw materials/waste.

Course-related learning outcomes

Knowledge:
1. has knowledge of physics and chemistry that allows understanding the phenomena and changes occurring in technological and environmental processes (k_w02)

2. has knowledge of raw materials, products, and processes used in closed-loop technologies (k_w10)
3. has knowledge of the physical and chemical basis of unit operations of closed-loop technology (k_w22)

Skills:
1. selects methods of process control and quality assessment of raw materials, products, and waste (k_u10)
2. performs analysis, verifies existing technical solutions in the field of closed-cycle technology (k_u11)

Social competences:
1. objectively assesses the level of his knowledge and skills, understands the importance of improving professional and personal competencies adequately to the changing social conditions and the progress of science (k_k05)
2. is aware of the negative impact of human activity on the state of the environment and actively counteracts its degradation (k_k10)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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The grade for the lectures is determined on the basis of the final test result, consisting of at least 40 questions of various types (single / multiple choice, supplement, calculation, marking on a drawing / diagram, simple accounting task, etc.), assessed according to the scale: 51 % -60% (3.0), 61% -70% (3.5); 71% -80% (4.0), 81% -90% (4.5), 91% -100% (5.0). The test will be carried out stationary or remotely via the Ekursy platform.

Programme content

Output and processing of raw materials as well as the processing and disposal of waste, basic unit operations used in industrial
conditions.

Course topics

The lecture covers the following topics: the role of processing in the management of raw materials and waste; systematics and conditions of used unit operations; basic unit operations used in industrial conditions: comminution, screening, flotation, extraction, enrichment, fermentation, drying - systems used, technological efficiency, raw material/waste susceptibility to the processing; closed-loop of raw materials/waste; energy recovery in processing.

Teaching methods

Multimedia presentation supported by examples presented on the board.

Bibliography

Basic
1. Procesy mechaniczne w inżynierii chemicznej. Koch Roman, Noworyta Andrzej. WNT, 1998. (ISBN: 83-204-2262-0)
2. Wybrane procesy jednostkowe w inżynierii środowiska. Bogdalski Mirosław i wsp., pod red. Marty Janosz-Rajczyk. Wydawnictwo Politechniki Częstochowskiej, 2004. (ISBN: 83-7193-271-5).
3.Podstawy gospodarki odpadami. Rosik-Dulewska Czesława, PWN, 2015. (ISBN: 978-83-01-18074-4)
Additional
1. Zarys technologii procesów przeróbczych. Blaschke Zofia i wsp. Wydawnictwo Akademii Górniczo-Hutniczej im. Stanisława Staszica, 1981.
2. Procesy odzysku i recyklingu wybranych materiałów. Ulewicz M., Siwka J., Wydawnictwo Wydziału Inżynierii Procesowej, Materiałowej i Fizyki stosowanej Politechniki Częstochowskiej, 2010.(ISBN: 978-83-87745-38-7)
3. Procesy odzysku i recyclingu metali nieżelaznych i stali. Ulewicz Małgorzata, Wydawnictwo Politechniki Częstochowskiej, 2015. (ISBN: 978-83-7193-636-4)
4. Biologiczne przetwarzanie odpadów. Jędrczak Andrzej, PWN, 2007. (ISBN: 978-83-01-15166-9)

Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,00
Classes requiring direct contact with the teacher	16	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	9	0,50