COURSE DESCRIPTION CARD - SYLLABUS

Course name
Industrial biocatalysis [S1TOZ1>BP]

Course

Field of study
Circular System Technologies

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr inż. Agata Zdarta
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Lecturers

Prerequisites

The student should have basic knowledge of organic chemistry, chemical technology and biology. They can obtain information from the indicated sources, interpret them correctly and draw conclusions.

Course objective

To acquaint students with the principles of conducting processes with the use of enzymatic catalysts. Presentation of the methods of biocatalysts preparation as well as the principles of design and development of industrial processes based on biocatalysis, maintenance of catalytic activity as well as process stability and equilibrium. Presentation of the strategy for the selection of a biocatalyst, carrier, process conditions, using examples from industry.

Course-related learning outcomes

Knowledge:
1. has knowledge of the development of ideas, goals, principles of operation and the organizational structure of the circular economy; knows the economic, economic and legal-administrative aspects of its functioning along with their interrelationships - k_w05
2. has knowledge of bio-based process design and development used in closed-loop technologies -

k_w10
3. has a basic knowledge of the life cycle of products, devices and installations used in closed-loop technologies - k_w12

Skills:
1. plans, selects equipment and scientific apparatus, carries out research, analyzes the results and formulates conclusions on this basis - k_u03
2. performs analysis, verifies existing technical solutions in the field of closed-loop technology - k_u11
3. is able to plan the stages of transformation and adaptation of existing facilities and devices and to design new facilities and devices in terms of meeting the principles of circular economy and to predict and assess the impact of the implementation of such projects on the natural environment - k_u14

Social competences:
1. cares about the safety of his own work and that of others, applies appropriate procedures and rules in emergencies - k_k04
2. supports the idea of harmonious, global civilization and economic development, promoting the principles of a circular economy, sustainable development and rational management of natural environment resources on a local and global scale - k_k09
3. is aware of the negative impact of human activity on the environment and actively prevents 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 lectures end with a test including open and closed questions. On-site assessment: written test with about 30 questions, minimum 15 open questions. On-line assessment: test on the e-Kursy platform including about 30 questions, minimum 15 open questions.

Programme content

Lectures within the discussed subject will present various aspects related to the use of biocatalysts in industrial processes.The principles and conditions of enzyme biosynthesis, isolation and formulation on a laboratory and industrial scale will be presented, with particular emphasis on the methods of ensuring high quality and stability of the product. Students will be familiarized with the characteristics of various enzymes of industrial importance, used in the economy in the following sectors: pharmaceutical, food, cosmetics, textile, paper production and others. Information will be presented on technological solutions, both already implemented in the industry and at the research and design stage. Attention will be paid to the aspect of the optimization of the industrial process based on the data sufficient for the properties of the biocatalyst.

Teaching methods

Lecture with multimedia presentation, discussion with students

Bibliography

Basic
1. W. Bednarski, J. Fiedurka „Podstawy biotechnologii przemysłowej” Wydawnictwo Naukowo Techniczne 2009
3. E. Michalski "Zarzadzanie przedsiębiorstwem" Wydawnictwo Naukowe PWN 2013
4. S. Ledakowicz "Inzynieria biochemiczna" Wydawnictwo M-Partner 2017
2. "Biotechnology of Microbial Enzymes : Production, Biocatalysis and Industrial Applications", praca zbiorowa, red. G. Brahmachari, A. L. Demain, J. L. Adrio, Elsevier Science Publishing Co Inc 2016
Additional
1. G. A. Płaza "Green production - green industry : bioeconomy and bio-based products", Politechnika Śląska 2018
2. "Innowacje i komercjalizacja w biotechnologii", praca zbiorowa, red. D.M. Trzmielak, Uniwersytet Łódzki 2013
3. K. Cynk "Etyczne i społeczne konsekwencje osiągnięć nowoczesnej biotechnologii", Uniwersytet Rzeszowski 2013

4. H. Lutz "Applied Biocatalysis", Wiley-VCH 2016
5. K. Faber "Biocatalysis in Organic Synthesis", Thieme Publishing Group, 2015

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	38	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	37	1,50