COURSE DESCRIPTION CARD - SYLLABUS

Course name
Biotechnology Project - enzymatic biotransformation

Course

Field of study
Circular System Technologies
Area of study (specialization)
-
Level of study
First-cycle studies
Form of study
full-time

Year/Semester
2/4
Profile of study
general academic
Course offered in
polish
Requirements
elective

Number of hours

Lecture
0
Laboratory classes
0
Other (e.g. online)
0
Tutorials
0
Projects/seminars
15

Number of credit points

1

Lecturers

Responsible for the course/lecturer:
dr inż. Wojciech Smułek

e-mail: wojciech.smulek@put.poznan.pl

Department of Organic Chemistry,
Faculty of Chemical Technology, room 220A,
ul. Berdychowo 4, 60-965 Poznań

Responsible for the course/lecturer:
-

Prerequisites

Student has knowledge of the basic conceptual categories and terminology used in biotechnology and related industries (chemical, pharmaceutical and food). He knows the basics of functioning of biological

systems and the basic characteristics of products obtained in these processes. They can obtain information from the indicated sources, interpret them correctly and draw conclusions.

Course objective

Learning to independently incorporate biotechnological processes into a series of classic chemical processes, with particular emphasis on biocatalytic enzymatic processes

Course-related learning outcomes

Knowledge

Student:

Has knowledge of mathematics, physics and chemistry necessary to describe the concepts, concepts and principles of closed-loop technology and the characteristics of connections and relationships between its components - K_W03

Has knowledge of the development of ideas, goals, principles of operation and the organizational structure of the circular economy; knows the economic, legal and administrative aspects of its functioning along with their interrelationships - K_W05

Has a basic knowledge of the neutralization and recovery processes of industrial and municipal waste - K_W07

Has knowledge of raw materials, products and processes used in closed-loop technologies - K_W10

Has a basic knowledge of the life cycle of products, devices and installations used in closed-loop technologies - K_W12

He knows the nomenclature, construction and principle of operation of structural elements of machines and mechanical devices - K_W20

Has basic knowledge related to the selection of devices used in closed-loop technologies - K_W21

Has knowledge of the physical and chemical basis of unit operations of closed-loop technology - K_W22

Skills

Student:

Can obtain information from literature, databases and other sources related to closed-loop technologies, also in a foreign language, integrate them, interpret them, draw conclusions and formulate opinions - K_U01

Uses computer programs supporting the implementation of tasks typical for closed-loop technology - K_U02

Has the ability to self-study, is able to use source information in Polish and a foreign language in accordance with the principles of ethics, reads with understanding, conducts analyzes, syntheses, summaries, critical assessments and correct conclusions - K_U04

Plans, selects equipment and scientific apparatus, carries out research, analyzes the results and formulates conclusions on this basis - K_U03

Can interact with other people as part of work on closed-loop technology and of an interdisciplinary nature - K_U09

Performs analysis, verifies existing technical solutions in the field of closed-loop technology - K_U11

Is able to prepare mass and energy balances of both unit processes and entire installations occurring in closed loop technologies - K_U17

Is able to make process designs of installations based on closed loop technologies - K_U20

Is able to estimate production costs in installations based on closed loop technologies - K_U23

Social competences

Student:

Independently determines and implements the action plan entrusted to him, defining priorities for its implementation, critically assesses the level of advancement in the implementation of the entrusted task - K_K03

Thinks and acts in an entrepreneurial manner - K_K06

Supports the idea of a harmonious, global civilization and economic development, promoting the principles of circular economy, sustainable development and rational management of natural environment resources on a local and global scale - K_K09

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Public presentation of the effects of the implementation of biological stages in the entire engineering process. The final grade is a weighted average of the grades from the preparation of multimedia presentations (weight 1), project documentation on bioprocesses (weight 2) and oral defense of the project (weight 2).

Programme content

As part of the course - biotechnology project - students learn the principles of conducting processes biotechnology and the necessary equipment, handling of substrates, products as wellbiocatalysts - enzymes. In addition, they will learn how to separate end products in the purpose of further

technological processes. Students will have the opportunity to perform along with leading a technological process project based on biocatalysts with the use of biotechnological aspects, calculating the costs of such modernization, profit and loss balance as also environmental impact assessments. In the final stage, the student (groups of one or two) should complete and present a design of the selected technological process from the industry along with the adaptation of the appropriate biotechnological process to improve production. He should make a description, basic balance calculations, block diagram and technical and measurement diagram. The student will present the effects of work in the form of a short presentation of the project.

Teaching methods

Multimedia presentations, tasks for own work, consultations with the teacher, work with a computer

Bibliography

Basic

1. Chmiel A., Biotechnologia - Podstawy mikrobiologiczne i biochemiczne. Wydawnictwo Naukowe PWN , 1998.

2. Christi Y., Moo-Young M.: Bioreactor design. In: Basic Biotechnology. Ed. by Retledge and Christiansen B. Cambridge University Press, 2001.

3. Libudzisz Z., Kowal K. Mikrobiologia techniczna, tom I i II. Wydawnictwo Politechniki Łódzkiej.

4. Bednarski W., Fiedurka J. Podstawy biotechnologii przemysłowej. PWN

5. McNeil B., Harvey L.M. Fermentation a practical approach. IRL Press.

6. Immobilization of Enzymes and Cells. Second edition. Ed. By. Guisan J., M. In: Methods in Biotechnology 22, Humana Press Inc, Totowa, New Yersey, 2006.

7. Grajek W., Gumienna M., Lasik M., Czarnecki Z. (2008): Perspektywy rozwoju technologii produkcji bioetanolu z surowców skrobiowych. Przemysł Chemiczny 87 (11): 1094-1101.

8. Schűtte H.: Cell disruption. W: “Methods in biotechnology”. Red. Schmauder H.-P. Str.153-164, Taylor & Francis e-Library, 2005.

Additional

Current scientific articles in the field of biotechnology as well as chemical technology and industry

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 laboratory classes/tutorials, preparation for tests, project preparation) [1]	9	0,5

[1] delete or add other activities as appropriate