COURSE DESCRIPTION CARD - SYLLABUS

Course name

Basic of biotechnology

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

compulsory

Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

prof. dr hab. inż. Ewa Kaczorek

Institute of Chemical Technology and Engineering

Department of Organic Chemistry

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Responsible for the course/lecturer:

Prerequisites

The student should have basic knowledge of biology, organic and bioorganic chemistry. She/He can

obtain information from the indicated sources, interprets them correctly and draws conclusions. The student understands the need to expand their competences and is ready to cooperate in a team.

Course objective

The aim of the course is to provide students with knowledge about conducting biotechnological processes based on waste and renewable raw materials, including the management of biomass. Understanding the role of enzymes in the processes of biosynthesis, biodegradation and biotransformation. To acquaint students with the physiology and metabolism of microorganisms and the possibilities of their practical use of microorganisms for the production of chemical compounds of industrial importance. Shaping students' ability to independently acquire knowledge, use literature and other sources.

Course-related learning outcomes

Knowledge

1. has an extensive knowledge of bioorganic chemistry and microbiology necessary to understand the phenomena and changes occurring in technological and environmental processes [K_W02],

2. knows the principles of environmental protection related to chemical production and the management of raw materials, materials and waste in a closed cycle [K_W06],

3. has knowledge of the negative impact of manufacturing and processing technologies on the natural environment [K_W08],

4. has knowledge in the field of technologies based on renewable materials (so-called green materials) [K_W15].

Skills

1. is able to obtain information from literature, databases and other sources related to closed-cycle technologies, also in a foreign language, integrate them, interpret them, draw conclusions and formulate opinions [K_U01],

2. has the ability to self-educate, 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],

3. correctly uses in discussions and properly uses nomenclature and terminology in the field of circular economy, chemistry, technology and chemical engineering, environmental protection and related disciplines, also in a foreign language [K_U05],

4. can plan and organize work individually and in a team [K_U08].

Social competences

1. demonstrates independence and inventiveness in individual work, as well as effectively interacts in a team, playing various roles in it; objectively assesses the effects of his own work and that of team members [K_K02],

2. objectively assesses the level of his knowledge and skills, understands the importance of improving professional and personal competences adequately to the changing social conditions and the progress of science [K_K05],

3. 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:
Stationary exam / on-line exam through e-courses:

The knowledge acquired during the lecture is verified by a written exam consisting of 20 test questions and 5 open questions. Minimum number of points to pass: 50% of points. Multiple-choice test questions.

In the field of laboratory classes

The pass mark will be the correct completion of the planned exercises and passing the test at the end of the class in the form of a test. In addition, the student is obliged to provide in electronic form for e-courses, after each laboratory class, reports on the conducted classes.

Assessment criteria In-class credit: test consisting of 10 single-choice or multiple-choice test questions and 2 open-ended questions. Minimum number of points to pass: 50% of points.

On-line credit: test consisting of 10 single-choice or multiple-choice test questions and 2 open questions. Minimum number of points to pass: 50% of points.

Programme content

The subject covers issues related to the conduct of biotechnological processes and their use in various industries. The discussed issues concern in particular: obtaining microorganisms for biotechnological processes, industrial and genetic characteristics; general characteristics and classification of the methods of culturing microorganisms, renewable raw materials used in the biotechnological industry, enzymes and immobilized cells, the use of biotechnology in environmental protection: bioremediation and composting, biofuels, biogas; management of biomass; economic aspects of biotechnological processes

In the field of laboratory classes:

1. Basic processes in biotechnology

2. Qualitative and quantitative selection of raw materials in biotechnology

3. Cleaning methods and post-processing

4. Conducting microbiological cultures

5. The use of enzymes

Teaching methods

Lecture with multimedia presentation, discussion with students.

Practical laboratory classes.

Bibliography

Basic

1. W. Bednarski, J. Fiedurka „Podstawy biotechnologii przemysłowej" Wydawnictwo Naukowo Techniczne

2. A. Chmiel „Biotechnologia" Wydawnictwo Naukowe PWN

3. A. Jędrczak „Biologiczne przetwarzanie odpadów" Wydawnictwo Naukowe PWN

4. Z. Libudzisz, K. Kowal „Mikrobiologia techniczna" Wydawnictwo Politechniki Łódzkiej, Łódź, 2000.

Additional

1. M. K. Błaszczyk „Mikroorganizmy w ochronie środowiska" Wydawnictwo Naukowe PWN

2. E. Klimiuk, M. Łebkowska „Biotechnologia w ochronie środowiska" Wydawnictwo Naukowe PWN, Warszawa 2003

3. S. Malepszy „Biotechnologia roślin" Wydawnictwo Naukowe PWN, Warszawa 2004

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	63	2,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	37	1,5

[1] delete or add other activities as appropriate