COURSE DESCRIPTION CARD - SYLLABUS

Course name
Introduction to biotechnology [N2TCh2-TCO>PB]

Course

Field of study
Chemical Technology

Year/Semester
1/1

Area of study (specialization)
General Chemical Technology

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
20

Laboratory classes
20

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

Coordinators

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Lecturers

Prerequisites

The student should have basic knowledge in biology, chemistry of organic compounds and chemical technology. Is able to obtain information from the indicated sources, correctly interprets them and draws conclusions.

Course objective

Transfer of knowledge to students on conducting biotechnological processes. The role of enzymes in biosynthesis, biodegradation and transformation processes. To become acquainted students with the physiology and metabolomics of microorganisms. To familiarize students with the possibilities of practical use of microorganisms for the production of industrial compounds.

Course-related learning outcomes

Knowledge:
1. Student has knowledge of complex biotechnology processes involving correct selection of materials, raw materials, apparatus and equipment applied in the processes of neutralization and recovery and planning of laboratory experiments and drawing up the acquired results - [K_W03]
2. Student has knowledge of materials, raw materials, products and biotechnological processes -

[K_W05]
3. Student has expanded knowledge about environmental protection associated with chemical processes and using their in a solving of biotechnological methods - [K_W08]
4. Student has an established expertise in the field of safety and health at work in biotechnology - [K_W10]

Skills:
1. Student has skills to obtain the necessary information from the literature and other sources related to the biological sciences, the ability to link them with other sciences - [K_U01]
2. Student can independently determine the direction of further education - [K_U05]
3. Student is able to apply the acquired knowledge in order to develop a biotechnology process - [K_U11]

Social competences:
1. Student understands the need for self-study and improve their professional competence - [K_K01]
2. Student is aware of the importance of microorganisms in the environment and biotechnological processes - [K_K02]

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 partial tests or weekly passes (information will be provided by the teacher during the first class). 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 single-choice or multiple-choice test questions and/or open-ended questions. Minimum number of points to pass: 50% of points.
On-line credit: test consisting of single-choice or multiple-choice test questions and/or open-ended questions. Minimum number of points to pass: 50% of points.

Programme content

Issues concerning conducting biotechnological processes, the role of enzymes in biosynthesis, biodegradation and transformation processes, physiology and metabolomics of microorganisms and possibilities of practical use of microorganisms for the production of industrial compounds.

Course topics

The course discusses issues related to the conduct of biotechnological processes and their use in various industries. These issues in particular concern: the history of biotechnology and its divisions, obtaining microorganisms for biotechnological processes, methods of cultivation of microorganisms: batch, fed-batch, continuous cultures; raw materials in the biotechnology industry; biocatalysis: the biochemistry of enzymes, enzymatic reactions and the factors determining its course, reaction kinetics, production and purification of enzymes, a class of enzymes, the use of industrial enzymes. Moreover, industrial microorganisms - technological and genetic characteristics. Fundamentals of genetic engineering. Biotechnology in environmental protection: bioremediation and composting, bio-fuels. Prospects for the development of biotechnology in the field of chemistry.
In the scope of laboratory classes:
1. Basic processes in biotechnology
2. Macro and microscopic observations of microorganisms, preparation of microbiological preparations
3. Conducting microbiological cultures
4. Enzymes and measurement of enzymatic activity

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. E. Kołakowski, W. Bednarski, S. Bielecki „Enzymatyczna modyfikacja składników żywności” Wydawnictwo Akademii Rolniczej w Szczecinie, Szczecin 2005.
5. 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	125	5,00
Classes requiring direct contact with the teacher	44	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	81	3,00