COURSE DESCRIPTION CARD - SYLLABUS

Course name
Designing bioprocesses [S2IChiP1-IBiB>PrB]

Course

Field of study
Chemical and Process Engineering

Year/Semester
1/2

Area of study (specialization)
Bioprocesses and Biomaterials Engineering

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
30

Number of credit points

2,00

Coordinators

dr hab. inż. Wojciech Smułek
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Lecturers

Prerequisites

The student has knowledge of the basic concepts used in biotechnology and chemical industry. Moreover, the student has basic knowledge of unit processes in chemical engineering including their mathematical description, knows the principles of chemical apparatus selection.

Course objective

The aim of the course is to familiarize students with the ways of implementation of industrial processes based on the use of microorganisms and biocatalysts, in particular technologies for obtaining products with high added value, as well as ways of processing waste products from other industries, and also to orient students to self-planning and design a way of practical implementation of bioprocesses.

Course-related learning outcomes

Knowledge:
the student:
- has knowledge of complex chemical processes, including the appropriate selection of materials, raw materials, apparatus and equipment for the implementation of chemical processes and characterization of the resulting products k_w04

- has knowledge of biotechnological raw materials, products and processes k_w06
- has knowledge about environmental protection problems, related to the implementation of industrial chemical processes k_w09

Skills:
the student:
- has the ability to acquire and critically evaluate information from literature, databases and other sources and to formulate opinions and reports on this basis k_u01
- has ability to work in a team and to manage a team k_u02
- has the ability to present research results in the form of a report, dissertation or a presentation k_u06
- is able to use natural resources in industry appropriately, guided by the principles of environmental protection and sustainable development k_u12
- is able to critically analyze industrial processes and introduce modifications and improvements, using the knowledge gained, including the latest achievements of science and technology k_u13
- is able to assess the technological suitability of raw materials and select a technological process in relation to product quality requirements k_u14
- has the ability to plan a technological project, including resource analysis, technical design, project financial assessment, environmental impact analysis, and marketing k_u15
- has the ability to present forecasts of the development directions of chemical and related industries, taking into account market, technical, formal and legal issues, as well as environmental protection in sectoral production processes k_u16

Social competences:
the student:
- is aware of the importance of and understands the non-technical aspects and effects of engineering activities, including their impact on the environment and the related responsibility for making decisions k_k02
- is able to cooperate and work in a group, taking various roles within it k_k03
- is able to think and act in a creative and entrepreneurial way k_k06
- is aware of the social role of a technical university graduate, especially understands the need to formulate and communicate to the society, especially through mass media, information and opinions on the achievements of technology and other aspects of engineering activities; makes efforts to convey such information in a commonly understood way, justifying different points of view k_k07

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
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).
Program content
Students will have the opportunity to make a project of technological process based on biocatalysts or microorganisms including various technological aspects and the overall balance of materials and economics. In the final stage, the student (working in groups of three or two) should perform and present a project of selected bioprocess including a description, basic calculations and schemes. The student will be evaluated on the basis of a defense of the project and the presentation of the current effects of work.

Programme content

Students will have the opportunity to make a project of technological process based on biocatalysts or microorganisms including various technological aspects and the overall balance of materials and economics. In the final stage, the student (working in groups of three or two) should perform and present a project of selected bioprocess including a description, basic calculations and schemes. The student will be evaluated on the basis of a defense of the project and the presentation of the current effects of work.

Course topics

none

Teaching methods

Multimedia presentations, tasks for own work, consultations with the teacher, work with 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.
9. B. Burczyk: Zielona chemia. Zarys, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2006.
Additional
Current scientific articles, patents and reports in the field of biotechnology and chemical technology

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00