



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of biotechnology [S1IFar2>PB]

### Course

Field of study

Pharmaceutical Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

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### Lecturers

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### Prerequisites

The student should have basic knowledge of biology, organic and bioorganic chemistry. 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

Knowledge of various biotechnological processes useful in pharmacy and used to obtain bioactive substances. Understanding the role of enzymes and microorganisms in the processes of biosynthesis, biodegradation and biotransformation. Learning modern techniques used in biotechnology, technology of immobilized biocatalysts or metabolic bioengineering. Shaping students' ability to independently acquire knowledge, use literature and other sources.

### Course-related learning outcomes

#### Knowledge:

1. Has knowledge of the production potential of living cells and its regulation and use by appropriate technological methods. [K\_W4]
2. Has knowledge of the ability to biosynthesis and biotransformation of specific cells and their parts and the possibility of use for various purposes, in particular for the preparation of drugs by biotechnology methods, which is within the scope of pharmaceutical engineering. [K\_W5]
3. Knows the scheme of the biotechnological process, its stages, the impact of various factors determining the course of this process and the ways of their presentation. [K\_W9]
4. Knows the methods of obtaining certain biologically active substances using various biotechnological methods and increasing their production. Knows how to improve the properties of medicinal substances produced by biotechnological methods. [K\_W14]

#### Skills:

1. Is able to choose the appropriate biotechnological method to produce a specific type of product that is used for medicinal purposes. [K\_U2]
2. Uses correct chemical, pharmaceutical and biotechnological terminology and nomenclature of compounds obtained by biotechnological methods, also in a foreign language. [K\_U3]
3. Is able to develop documentation (protocol) of undertaken research and perform simple biological measurements. [K\_U5]

#### Social competences:

1. Is ready to critically assess his/her knowledge, understands the need for further education, supplementing disciplinary knowledge and raising his professional, personal and social competences, understands the importance of knowledge in solving problems and is ready to seek expert opinions. [K\_K1]
2. Is aware of the importance of understanding non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions, correctly recognizes problems and makes the right choices related to the exercise of the profession, in accordance with the principles of professional ethics, care for achievements and traditions of the profession. [K\_K3]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Stationary / on-line credit through e-courses:

The knowledge acquired during the lecture is verified by a written test 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 credit will be the correct completion of the planned exercises and passing 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. Stationary/on-line credit through e-courses: a test consisting of single or multiple-choice and/or open-ended questions. Minimum number of points to pass: 50% of points.

### Programme content

The program includes the following topics:

1. Basic principles of biotechnology.
2. Obtaining microorganisms for biotechnological processes, industrial and genetic characteristics.
3. Methods of culturing microorganisms and living cells.
4. Bioreactors.
5. Biological and technological aspects of the biotechnological process.
6. Biocatalysts.
7. Production of biologically active compounds.

### Course topics

The course covers issues related to the basic principles of biotechnology. The discussed issues relate in particular to: obtaining microorganisms for biotechnological processes, industrial and genetic

characteristics; general characteristics and classification of microorganism cultivation methods, living cells and organisms as bioreactors. Biological and technological aspects of the biotechnological process. Immobilization of biocatalysts and their applications. Discussion of selected technological solutions for the production of biologically active compounds.

In the field of laboratory classes:

1. Becoming familiar with the rules into the laboratory and learning how to use basic laboratory equipment. Moreover, the presentation of the subject of microbiological media and the sterilization process.
2. Enzymes and measurement of their activity.
3. Immobilization of yeast cells and establishing a culture on a liquid medium.
4. Assessment of physicochemical parameters of microbiological media.

### 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. C. Ratledge, B. Kristiansen (red.): Podstawy biotechnologii, Wydawnictwo Naukowe PWN
4. Z. Libudzisz, K. Kowal „Mikrobiologia techniczna” Wydawnictwo Politechniki Łódzkiej, Łódź, 2000.

Additional:

1. Fiedurek J. (red.) Podstawy wybranych procesów biotechnologicznych , WNT
2. S. Malepszy „Biotechnologia roślin” Wydawnictwo Naukowe PWN, Warszawa 2004

### Breakdown of average student's workload

	Hours	ECTS
Total workload	55	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)	25	1,00