



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Microbiology

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### Course

Field of study

Circular System Technologies

Area of study (specialization)

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Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

compulsory

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### Number of hours

Lecture

30

Laboratory classes

15

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3

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### Lecturers

Responsible for the course/lecturer:

prof. dr hab. inż. Ewa Kaczorek

Responsible for the course/lecturer:

Institute of Chemical Technology and  
Engineering

Department of Organic Chemistry

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### Prerequisites

The student should have basic knowledge of biology 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 obtain knowledge on the basic issues of microbiology, mainly in the field of microbiology used in biotechnology. Mastering the knowledge about selected groups of microorganisms, their morphology and physiology, and the possibility of using them in bioprocesses. Microorganisms in water and soil environment, their role and importance. Mastering practical skills in performing selected microbiological techniques. 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].

#### 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:

Knowledge acquired during the lecture is verified by two 45-minute written test carried out during the 7th and 15th lectures. Each test consists of 20 test questions (multiple choice test) and 5 open-ended questions. Passing threshold: 50% of points.

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 course covers the following topics: the subject of microbiology; morphology of bacteria, fungi and viruses; vegetative and spore forms; cell metabolism; biochemical routes, obtaining microorganisms for biotechnological processes; safe laboratory work with microorganisms; ways of storing microorganisms; environmental microbiology; systems of direct and indirect interdependence between microorganisms; cycles of carbon, nitrogen, phosphorus, sulfur cycles and microorganisms, nitrogen fixation, water microbiology.

Organization of the microbiological laboratory. Safety of work with microorganisms. Sterilization and disinfection. Cultivation of microorganisms (growth curve, culture media). Nutritional requirements. Microorganisms in the laboratory environment (colony morphology, types of growth). Techniques for obtaining pure cultures. Macro- and microscopic observations of microorganisms. Preparation of microbiological preparations and structure of microorganisms.

### Teaching methods

Lecture with multimedia presentation, discussion with students.

Practical laboratory classes.

### Bibliography

Basic

1. Władysław J.H., Kunicki-Goldfinger, „Życie bakterii”, Wydawnictwo Naukowe PWN.



2. Hans G. Schlegel, „Mikrobiologia ogólna”, Wydawnictwo Naukowe PWN.
3. Nicklin J., Graeme-Cook K., Killington R., „Mikrobiologia”, Wydawnictwo Naukowe PWN.

Additional

1. Abigail A. Salyers, Dixie D. Whitt, „Mikrobiologia” Wydawnictwo Naukowe PWN.
2. Baj J., Markiewicz Z., „Biologia molekularna bakterii”, Wydawnictwo Naukowe PWN.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	50	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	25	1,0

<sup>1</sup> delete or add other activities as appropriate