



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Environmental Biology I [S1IŚrod2>BŚI]

### Course

Field of study

Environmental 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

30

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr Beata Mądrecka-Witkowska

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### Lecturers

### Prerequisites

1. Knowledge: Basic knowledge of the biology and ecology of the range of material from secondary school.
2. Skills: Ability to use literature and self-education, making observations, drawing conclusions, working in a group.
3. Social competencies: Awareness of the need to learn, ability to work in a group.

### Course objective

Familiarize students with the basic knowledge about the occurrence and use of microorganisms in the environment. Familiarize students with the problems of ecology, environmental contamination and preventing degradation.

### Course-related learning outcomes

Knowledge:

1. Student knows the classification, systematic position, structure and characteristics of organisms.
2. Has basic knowledge of ecology.
3. Has ordered knowledge of ecology, knows the ecological laws (Liebig and Shelford), elements of the biosphere, population characteristics and has knowledge of development trends in the field of the role of microorganisms in wastewater treatment and air microbiology.

#### Skills:

1. Student is able to carry out experiments, including measurements in the field of selected elements of air protection systems and microbiological contamination of the environment.
2. Can see the aspects of applying the principles of sustainable development.
3. Is able to identify simple engineering tasks of selected water, sewage and air disinfection systems.

#### Social competences:

1. Student is aware of the effects of engineering activities and its impact on the natural environment.
2. Is aware of the social role of the graduate and is prepared to provide information in a commonly understandable way.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

#### Lectures:

Exam in the form of open questions (and/or) closed questions of various types.

Grading scale: 0-50%: 2,0; 51-60%: 3,0; 61-70%: 3,5; 71-80%: 4,0; 81-90%: 4,5; 91-100%: 5,0.

Bonus for active participation in lectures.

### Programme content

The program covers the following topics:

1. The place of environmental biology in environmental engineering.
2. Taxonomy of living organisms.
3. Basics of environmental microbiology.
4. Basics of hydrobiology.
5. Main concepts and laws used in ecology.
6. Natural resources.
7. Anthropogenic changes of the natural environment and their effects.

### Course topics

The program of lectures covers the following topics:

1. The place of environmental biology in environmental engineering. Basics of taxonomy of living organisms. Features of prokaryotic and eukaryotic organisms. Viruses.
2. Ecology of microorganisms. Nutritional requirements of microorganisms. The influence of external factors on microorganisms.
3. Basics of microbial metabolism. Cellular respiration (aerobic, anaerobic, fermentation). Autotrophic processes (photosynthesis and chemosynthesis).
4. Basics of hydrobiology. Hydrosphere. Water cycle in nature. Types of water on the globe. Water resources. Origin and classification of lakes. Water zones in the lake.
5. Habitat factors prevailing in surface waters. Annual thermal and oxygen cycle. Mictic types of lakes. General characteristics of hydrobionts. Characteristics of flowing waters and anthropogenic aquatic ecosystems.
6. Water trophy. Causes and effects of water eutrophication. Water blooms.
7. Basics of water microbiology. Microbiological contamination of water. Saprobiality of waters. Self-purification of water. The role of microorganisms in wastewater treatment.
8. Water-related human diseases and parasites.
9. Basic concepts and laws used in ecology. Abiotic and biotic factors occurring in the environment. Liebig's law of minimum. Shelford's Law of Tolerance.
10. Characteristics of the population. Population structure and dynamics. Ecology of biocenoses. Natural and artificial biocenoses. Interdependencies between species.
11. Ecology of ecosystems. Trophic structure. Circulation of matter and energy in the ecosystem. Auto- and heterotrophic ecosystems, primary and secondary production. Ecological succession.
12. Natural resources. Anthropogenic changes in the natural environment and their effects.

### Teaching methods

#### Lectures:

Informative lecture with elements of a conversational lecture; Multimedia presentation; Problem lecture;

## Bibliography

### Basic:

1. Baker S., Nicklin J., Griffiths C. Krótkie wykłady Mikrobiologia. Wydawnictwo Naukowe PWN, Warszawa, 2021, 2022.
2. Libudzisz Z., Kowal K., Żakowska Z. Mikrobiologia techniczna. Tom 1., Wydawnictwo Naukowe PWN, Warszawa, 2007 i nowsze.
3. Kunicki-Goldfinger W. Życie bakterii. Wydawnictwo Naukowe PWN, Warszawa, 2005, 2006.
4. Michałkiewicz M., Fiszler M. Biologia sanitarna - ćwiczenia laboratoryjne. Skrypt Politechniki Poznańskiej, 2007.
5. Górniak A., Kajak Z., Hydrobiologia - limnologia. Wydawnictwo Naukowe PWN, Warszawa, 2022.
6. Weiner J. Życie i ewolucja biosfery. Wydawnictwo Naukowe PWN, Warszawa, 2012.
7. Banaszak J., Wiśniewski H. Podstawy ekologii. Wydawnictwo Adam Marszałek. 2003, 2004.

### Additional:

1. Lampert W., Sommer U. Ekologia wód śródlądowych. Warszawa, PWB, 2001.
2. Kilarski W., Pyza E., Tylko G. Strukturalne podstawy biologii komórki. Wydawnictwo Naukowe PWN SA, Warszawa, 2022.
3. Błaszczak M. K. Mikrobiologia środowisk. Wydawnictwo Naukowe PWN, Warszawa, 2010 i nowsze.
4. Baj. J. Mikrobiologia. Wydawnictwo Naukowe PWN, Warszawa, 2018.
5. Wójcik J. Antropogeniczne zmiany środowiska przyrodniczego Ziemi. Wydawnictwo Naukowe PWN, Warszawa, 2020.

## 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