COURSE DESCRIPTION CARD - SYLLABUS

Course name
Environmental Biology II [S1IŚrod2>BŚII]

Course

Field of study
Environmental Engineering

Year/Semester
1/2

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
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

dr Beata Mądrecka-Witkowska
beata.madrecka@put.poznan.pl

Lecturers

Prerequisites

1. Knowledge: Basic knowledge of the biology and ecology of the range of material from secondary school. 2. Skills: The ability to use literature and self-education, making observations, drawing conclusions, working in a group. 3. Social competencies: Is aware of the need to learn, able 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. The student has knowledge in environmental biology useful for formulating and solving simple tasks in environmental engineering.
2. The student has structured knowledge from environmental biology, he knows indicator bacteria used in water, sewage and air tests, and methods of disinfection of these environments.
3. Student has detailed knowledge of sanitary biology, including the threats arising from the presence of

microorganisms in water, sewage, air.
4. The student knows the basic methods, techniques and tools to solve simple engineering tasks, including water and sewage disinfection.

Skills:
1. The student is able to carry out simple experiments, characterize and assess the positive and negative role of microorganisms in the surrounding environment.
2. The student is able to identify and assess the degree of microbiological pollution of water, sewage, air and propose proper disinfection.
3. The student is able to prepare the elaboration of problems of environmental biology and ecology.

Social competences:
1. The student is aware of the effects of engineering activities and its impact on the natural environment.
2. The student is aware of the responsibility for making decisions.

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.

Laboratories:
- entrance tests before each laboratory
- laboratory reports
- continuous assessment during each class (rewarding activity)

Programme content

The course content includes:
1. Basics of microbiology.
2. Research methods used in microbiology.
3. Principles of work in a microbiological laboratory.
4. The use of microorganisms in environmental quality research.
5. Microbiological assessment of environmental quality.

Course topics

The lecture program covers the following topics:
1. Research methods in microbiology. Cultivation and identification of microorganisms. Microbiological media. Methods of performing microbiological cultures. Sterilization and disinfection in the microbiology laboratory. Microscopic techniques.
2. Biological indicators in assessing the quality of surface waters. Basic taxonomic groups of phytoplankton and zooplankton.
3. Bacteriological sanitary analysis of water. Microbiological quality of water intended for human consumption. Indicator microorganisms in water testing. Polish and global legal regulations and recommendations regarding the quality of drinking water.
4. Organisms found in water intakes and tap water. Iron, manganese and sulfur bacteria. The role of microorganisms in water treatment.
5. Biofilms. Microbiological corrosion. Water disinfection.
6. Microbiological parameters in the assessment of water quality in bathing areas and swimming pools.
7. Air microbiology. Bioaerosol. Methods of research and assessment of microbiological air quality. Aerogenic diseases. Air sterilization methods. Biodeterioration.

The laboratory training program covers the following topics:
1. Occupational health and safety regulations. Getting to know the equipment used in the microbiology laboratory. Microscope, principles of microscopy. Preparation of media for cultivating microorganisms and their sterilization.
2. Morphology of cells and colonies of bacteria and microscopic fungi. Preparation of vital and stained

preparations.
3. Structure of a typical plant cell and microscopic analysis of plankton.
4.Bacteriological sanitary analysis of water - water testing using the fermentation-test-tube method (FP), membrane filters (FM) and plate - inoculation.
5.Bacteriological sanitary analysis of water - analysis of results. Identification of microorganisms.
6. Bacteriological air pollution. Air disinfection with UV rays.
7. Assessment of the sanitary condition of the air in the examined rooms.

Teaching methods

Lectures:
Informative lecture with elements of a conversational lecture; Multimedia presentation; Problem lecture; Discussion

Laboratories:
case study, measurement, observation, experiment, individual and group work

Bibliography

Podstawowa:
1. Michałkiewicz M., Fiszer M. Biologia sanitarna - ćwiczenia laboratoryjne. Skrypt Politechniki
2. Baker S., Nicklin J., Griffiths C. Krótkie wykłady Mikrobiologia. Wydawnictwo Naukowe PWN, Warszawa, 2021, 2022.
3. Libudzisz Z., Kowal K., Żakowska Z. Mikrobiologia techniczna. Tom 1., Wydawnictwo Naukowe PWN, Warszawa, 2007 i nowsze.
4. Kunicki-Goldfinger W. Życie bakterii. Wydawnictwo Naukowe PWN, Warszawa, 2005, 2006.
5. Górniak A., Kajak Z., Hydrobiologia - limnologia. Wydawnictwo Naukowe PWN, Warszawa, 2022.

Uzupełniająca:
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.Błaszczyk M. K. Mikrobiologia środowisk. Wydawnictwo Naukowe PWN, Warszawa, 2010 i nowsze.
4. Baj. J. Mikrobiologia. Wydawnictwo Naukowe PWN, Warszawa, 2018.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	45	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00