



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Biology with ecology [S1IŚrod1>BzE]

### 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

elective

### Number of hours

Lecture

15

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

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### Lecturers

dr Beata Mądrecka-Witkowska

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### Prerequisites

1. Knowledge: Basic knowledge of the biology and ecology of the range of material from high 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 micro-organisms 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:

Examination, tests, laboratory reports

Exam, tests, laboratory reports

During the exam session, the written exam is conducted. During the laboratories, the evaluation of students' knowledge and work is evaluated with the use of: written tests, oral answers, laboratory reports.

During the semester, students are consulted (1.5h / week).

Registration for the exam: within 2 weeks after the setting the examination date with students, before the session the date of retake exam is also determined. The exam takes place during the exam, retake exam takes place during the resit session. Exam in the session and an retake exam are written.

Getting points for the exam (eg. 40 questions, max. 40 pts.). For each answer you get from 0 to 1 point. Approximately 45-50% of the maximum points must be obtained. Detailed information on scoring and rating scale are given before crediting.

### Programme content

Lectures: Place of microbiology in environmental engineering; basics of systematics of organisms; the characteristics and structure of prokaryotic organisms; eukaryotic cell structure and physiology of organisms. The concept of metabolism (prokaryotes nutrition, respiration, reproduction, conjugation). Physiology of bacteria; The impact of external factors on microorganisms. Basics of microbial culture and their practical use. Microbial culture media; Bacteriological sanitary analysis of water. Indicator microorganisms in water testing and drinking water acceptance criteria; Polish and international (WHO) regulations on the quality of water (for drinking, bathing, swimming pools). Drinking water treatment. Groundwater (surface and underground). Drinking water disinfection methods. Microorganisms present in the water: ferric, manganese and sulphur bacteria. Parasitic protists present in the water. Waterborne parasitic diseases. Characteristics of human parasites. Basics of hydrobiology. General characteristics of the lakes; annual thermal and oxygen cycle. Microbiology and pollution of the air; test methods for microbiological air pollution, disinfection and air purification, airborne diseases.

Laboratory:

1. Organization of work in the laboratory. Health and Safety Regulations. Culture media for microbial culture, sterilization and disinfection.
2. Structure of prokaryotic cell. Microscopic observations of stained preparations. Features of the bacterial colony. Ecology of bacteria, the influence of environmental factors on the growth of microorganisms.
3. Sanitary bacteriological analysis of water, test on fermentacyjno - the tube (FP), membrane filters (FM) and plate culture.
4. Sanitary bacteriological analysis of water, reading and final judgment. Identification of microorganisms.
5. Bacteriological pollution of air. Test methods. Air pollution indicator organisms. Air disinfection UV rays.
6. Evaluation of the sanitary condition of the tested air spaces.
7. Structure of eukaryotic cells. Morphology and ecology of selected representatives of phyto- and

zooplankton.

## Teaching methods

Information lecture, lecture with multimedia presentation, problem lecture. Laboratories: exercise, problem, case study, measurement, observation, experiment.

## Bibliography

Basic:

1. Michałkiewicz M., Fiszer M. Biologia sanitarna - ćwiczenia laboratoryjne. Skrypt Politechniki Poznańskiej, 2007
2. Lampert W., Sommer U. Ekologia wód śródlądowych. Warszawa, PWB, 2001.
3. Kunicki-Goldfinger W. Życie bakterii. Wydawnictwo Naukowe PWN, 2001
4. Kunicki-Goldfinger W., Frejlik S. Podstawy mikrobiologii i immunologii. PWN W-wa.

Additional:

1. Singleton P. Bakterie w biologii, biotechnologii i medycynie. PWN, 2000.
2. Nicklin J., Graeme-Cook K., Paget T., Killington R.A. Mikrobiologia - krótkie wykłady. PWN, 2000.
3. Zaremba M.L., Borowski J. Mikrobiologia lekarska. PZWL, 2001.
4. Pond E.H., Clark T.F. Mikrobiologia i biochemia gleb. Wyd. UMCS, 2000.

## 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