

# MICROBIOLOGY

Course Code/Course ID : Mikrobiologia 01LBUD\_pNadGen8O8Q3

Type of course: compulsory

Teaching language: english

Director of studies: dr hab. Marlena Piontek, prof. UZ

Name of lecturer: IEE teachers

Form of instruction	Number of teaching hours per semester	Number of teaching hours per week	Semester	Form of receiving a credit for a course	Points ECTS
<b>Full-time studies</b>					4
Lecture	15	1		Exam	
Laboratory	15	1		Grade	

## **PURPOSE OF COURSE:**

To provide students with the classification, identification and morphology of different groups of microorganisms, viruses, bacteria, actinomycetes and moulds. Growth, reproduction, the presence and the role of microorganisms in various types of environments. To familiarize students with a positive and negative side effects of microorganisms on the human environment. Understanding the representatives of selected strains of microorganisms used in various industries. Microbiological methods for determining the activity of microorganisms in different environments and the impact of environmental factors on microorganisms.

## **ENTRY REQUIREMENTS:**

Formal: basic biology, ecology, organic and inorganic chemistry.

## **RANGE OF TOPICS COURSE:**

The program of lectures:

The emergence and development of microbiology. Morphological and ecological characteristics of different groups of microorganisms (mainly viruses, bacteria, actinomycetes and moulds). The importance and role organelles occurring in bacterial cells. The growth and reproduction of microorganisms. The presence and role of microorganisms in various environments. Environmental effects on the microorganisms found in soil, water and wastewater. Participation and the role of microorganisms during fermentation of various substrates (eg, alcoholic fermentation, butterhead, methane). The importance of microorganisms in composting processes, for example during cellulose degradation. Share and importance of microorganisms in the metabolism of nitrogen, phosphorus, sulfur and iron (in soil and aquatic environment). The enzymes secreted by microorganisms and their importance to the economy of man.

Laboratory exercise program:

Introduction to the basic principles and techniques of work and equipment used in the microbiology. Microscopic analysis of bacteria, actinomycetes and moulds. The study size, shape, and bacterial cell systems. Determining the number of microorganisms in sewage

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sludge, water and soil. Isolation of pure strains of microorganisms from water, soil and sewage sludge. Bacteriological in sanitary water analysis. Determination of *coli* forms. Study participation of microorganisms in a variety of biological processes such as during the fermentation. Determination of the impact of environmental factors (pH, temperature, radiation) on the growth and development of selected groups of microorganisms.

### METHODS OF INSTRUCTION:

Feeding methods: lecture information (lecture, along with a multimedia presentation), lecture problem.

The methods of searching: independent work of students with microscopes and identification (determination of microorganisms species - laboratory classes) independent performance experience for the given scheme implementation exercise.

### LEARNING OUTCOMES:

Symbol	Learning outcomes after completion of the course. Student:	The reference to the effects of education in the field of technical sciences
<b>Knowledge</b>		
<b>K-W09</b>	has ordered knowledge of the microbiological testing, classification, isolation and identification of microorganisms	<b>T1A_W04 T1A_W05</b>
<b>K_W09</b>	has knowledge of conduct of microbiological research and microbial preparations used in various branches of human activity	<b>T1A_W04 T1A_W05</b>
<b>Skill</b>		
<b>K_U08</b>	able to analyze their own actions on the use of microorganisms and indicate the effects of the implementation of research	<b>T1A_U08; T1A_U09</b>
<b>Social competences</b>		
<b>K_K03</b>	appreciates importance of having knowledge of microbial processes	<b>T1A_K02</b>

### ASSESSMENT CRITERIA:

Completion of laboratories: the basis for passing the course is the average of grades from the reports on the completed classes and the grade from the written colloquium at the end of the laboratory classes.

Passing the lecture: passing the lecture is a written test containing 3 exam questions. Grading scale: 0 ÷ 50% - insufficient, 51 ÷ 60% - satisfactory, 61 ÷ 70% - satisfactory plus, 71 ÷ 80% - good, 81 ÷ 90% - good plus, 91 ÷ 100% - very good. The basis for determining the total mark is the weighted average obtained by adding: 0,5 lecture grade and 0,5 laboratory test grade.

The weighted average is rounded to two decimal places. The total rating is based on the weighted average according to the rule: below 3.24 - sufficient, from 3.25 to 3.74 - satisfactory plus, from 3.75 to 4.24 - good, from 4.25 to 4.74 - a good plus, from 4.75 - very good.

### SELF STUDENT'S WORK:

Contact hours (participation in classes, consultations, exams, etc.) 75  
Student's independent work (preparation for: classes, colloquium, exam, studying literature

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preparation of: written work, project, presentation, report, presentation, etc.)  
25

### **RECOMMENDED READING:**

1. Mara D., Horan N. "Handbook of water and wastewater microbiology" Elsevier 2003, UK.
2. Bitton G., "Wastewater microbiology", Wiley-Liss 2005, United States of America.
3. Libudzisz Z., Kowal K., Technical microbiology (Mikrobiologia techniczna). T. 1 i 2. Wyd. Polit. Ł., Łódź 2000

### **OPTIONAL READING:**

1. Proft T., "Bacterial Toxins: Genetics, Cellular Biology and Practical Applications", Caister Academic Press 2013.
2. Błaszczak K.M., Microorganisms in environmental protection (Mikroorganizmy w ochronie środowiska). Wyd. Nauk. PWN, Warszawa 2007
3. Singleton P., Bacteria in biology, biotechnology and medicine (Bakterie w biologii, biotechnologii i medycynie). Wyd. Nauk. PWN, Warszawa, 2000

### **REMARKS:**

