

FACULTY OF CHEMISTRY

SUBJECT CARD

Name of subject in Polish Mikrobiologia przemysłowa
 Name of subject in English Industrial microbiology
 Main field of study (if applicable): Biotechnology
 Specialization (if applicable):
 Profile: academic
 Level and form of studies: 1st level, 2nd level – supplementary semester*, full-time
 Kind of subject: obligatory
 Subject code BLC014005
 Group of courses NO

	Lecture*	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)			45		
Number of hours of total student workload (CNPS)			60		
Form of crediting			crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points			2		
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BK) classes			1,5		

***PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES**

1. Biological background at academic level
2. Microbiological knowledge at academic level.
3. Laboratory practice in microbiological work.

SUBJECT OBJECTIVES

- C1 Understanding the morphological and physiological characteristics of major groups of microorganisms of industrial importance.
- C2 To learn how to acquire, improve and identify new strains of microorganisms
- C3. Knowledge of the microflora of raw materials and food products.
- C4. Knowledge of methods of testing microbiological purity of samples of various origins.
- C5. Teaching methods of practical examination of a specific feature of microorganisms.

SUBJECT LEARNING OUTCOMES		
relating to skills:		
PEK_U01 Student is able to design and carry out an experiment that allows to study a specific enzymatic activity of a microorganism and analyse the obtained results;		
PEK_U02 The student is able to carry out the process of disintegration of biological material and check its effectiveness;		
PEK_U03 The student can isolate a new species of microorganisms from the natural environment and make their basic characteristics;		
PEK_U04 Student is able to examine the sensitivity of microorganisms to antibiotic substances;		
PEK_U05 The student is able to carry out the basic microbiological analysis of a specific sample;		
PEK_U06 The student is able to carry out the process of microorganisms immobilization and apply the biocatalyst thus obtained in a particular process.		
PROGRAMME CONTENT		
Laboratory		Number of hours
Lab 1	The form of passing the classes. Conditions for safe work in a microbiological laboratory. Description of basic work tools..	4
Lab 2	The process of disintegration of microorganisms. Mechanical methods: comparison of the process of disintegration of yeast cells using a ball mill and manual grinding of cells in a mortar.	4
Lab 3	The process of disintegration of microorganisms. Non-mechanical methods: comparison of the process of disintegration of bakery yeast cells by freezing with the disintegration process using detergents.	4
Lab 4	Water purity testing. Testing of water samples for the content of fungi and bacteria. Coli test. Searching for microorganisms with a cellulolytic activity in water.	4
Lab 5	Analyzing and discussing the results of experiments from previous laboratory. Enzymes. Examination of bacteria's ability to produce extracellular amylases. Examination of proteolytic activity of selected microorganisms. Examination of bacterial lipolytic activity.	4
Lab6	Reading and discussing the results of experiments from previous laboratory. Enzymes. Determination of the activity of selected enzymes from the oxidoreductase class, in plant material.	4
Lab7	Isolation of microorganisms from various soil samples. Morphological characteristics of isolates. Determination of the isolates ability to ammonification. Study of isolates in the production of antibiotic substances.	4
Lab8	Enzymes. Quantitative examination of lipolytic activity of newly isolated microorganisms, using the colorimetric method.	2
Lab9	Written test on theoretical and practical knowledge from classes 2-8.	
Lab10	Immobilization of microorganisms. The method of cross-linking baker's yeast in calcium alginate.	
Lab11	Biocatalysis. Comparison of reducing activity of baker's yeast (free cells and immobilized yeast) to acetophenone.	
Lab12	Antibiotics. Sensitivity study of selected bacterial species on commercially available antibiotics. Determination of the inhibitory concentration of antibiotics on bacteria. The method of Szybalski. Synergistic action of drugs.	
Lab13	Colorimetric determination of lactic acid content in silage. Examination of food	

	samples for the content of lactic acid produced by bacteria capable of lactic fermentation.	
Lab14	Complementary laboratory allowing to make up for outstanding exercises resulting from justified absence from classes.	
Lab15	Written test of theoretical and practical knowledge from classes 10-13.	
	Total hours	45
TEACHING TOOLS USED		
N1. Performing tasks in the laboratory		
EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation (F – forming (during semester), P – concluding (at semester end))	Learning outcomes number	Way of evaluating learning outcomes achievement
F1 (laboratory)	PEK_U01 – U03	Written test 1(max 30 points)
F2 (laboratory)	PEK_U04 – U06	Written test 2 (max 30 points)
C (laboratory) = 3.0 (F1+F2) = 50% - 58% points 3.5 (F1+F2) = 59% - 65% points 4.0 (F1+F2) = 66% -75% points 4.5 (F1+F2) = 76% - 85% points 5.0 (F1+F2) = 86%-95% points 5.5 (F1+F2) = 96% - 100% points		
PRIMARY AND SECONDARY LITERATURE		
<u>PRIMARY LITERATURE:</u>		
[1] Enzymy w technologii spożywczej, red. Robert J. Whitehurst, Maarten Van Oort, PWN, 2017		
<u>SECONDARY LITERATURE:</u>		
[1] Enzymes In Industry – Production and Application, red.W.Aehle, Wiley-VCH, 2004		
[2] Biocatalysts and Enzyme Technology, red. K. Bucholtz, V. Kasche, U. Bornscheuer, Wiley-VCH, 2005		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
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