

FACULTY OF CHEMISTRY					
SUBJECT CARD					
Name of subject in English	Microbiology I				
Main field of study (if applicable)	Biotechnology				
Specialization (if applicable)					
Profile	academic				
Level and form of studies:	1 st level/ full-time				
Kind of subject	obligatory				
Subject code					
Group of courses	NO				
	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU)	30		30		
Number of hours of total student workload (CNPS)	90		60		
Form of crediting	crediting with grade		crediting with grade		
For group of courses mark (X) final course					
Number of ECTS points	3		2		
including number of ECTS points for practical (P) classes			2		
including number of ECTS points for direct teacher-student contact (BU) classes	1,3		1,4		
*PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES					
1. Higher school level of biology.					
SUBJECT OBJECTIVES					
C1	To provide students with a basic definitions and vocabulary essential for microbiology				
C2	To provide students with knowledge about morphology, physiology and systematics of bacteria.				
C3	To provide students with knowledge about work in the microbiological labs.				
C4	To provide students with knowledge about planning and performing the experiments with the microbes.				
SUBJECT LEARNING OUTCOMES					
related to knowledge:					
PEK_W01 – Student knows the basics from the microbiology area					
PEK_W02 – Student knows the basics of bacterial systematics and diagnostic.					
PEK_W03 – Student has knowledge about the methods of observation and cultivation of microbes, knows the morphology and physiology of the bacterial cells structures.					
PEK_W04 – is able to characterize the bacterial cell cycle and is able to point the reasons of differentiation in bacterial populations.					
related to skills:					
PEK_U01 – Student knows the microbial lab equipment, knows the basics rules of the work with microbes, is able to use proper tools for correct purposes.					
PEK_U02 – Student is able to work under sterile conditions and knows the cultivation and nutrient requirements of the bacteria					
PEK_U03 – Student knows the microscopic methods allowing to preliminary biochemically characterize the microbes					
PEK_U04 – Student is able to plan and make the experiments from the area of general microbiology					

PROGRAMME CONTENT		
Form of classes - lecture		Number of hours
Lec 1	Microbiology: history, the most important scientist, who developed this science. Basic microbiology terminology.	2
Lec 2	Taxonomy. Basic definitions related to the prokaryotic organisms	2
Lec 3	Taxonomy. Applied methods in taxonomy	2
Lec 4	Cultivation and growth of microbes. Cultivation methods and media. Growth curve for stationary cultivation.	2
Lec 5	Cultivation and growth of microbes. Microbial cells counting and storage. Microscopic observations of bacteria samples.	2
Lec 6	Physical and chemical factors influencing bacterial growth. classification of bacteria regarding optimal temperature, aeration, media pH. Bacterial growth control: disinfection, sterilization, aseptic (bactericidal and bacteriostatic factors).	2
Lec 7	Antibiotics. Examples and mode of actions.	2
Lec 8	Antibiotics. Examples and mode of actions.	2
Lec 9	Bacterial cell morphology. Structure and function: bacterial cilia and flagella (H antigens, different types of flagella locations); fimbria and pili.	2
Lec 10	Bacterial cell morphology. Structure and function: bacterial cell envelopes: capsules, cells.	2
Lec 11	Bacterial cell morphology. Structure and function: bacterial cell envelopes: plasma membranes.	2
Lec 12	Bacterial cell morphology. Structure and function: bacterial cell envelopes: plasma membranes – transportation systems.	2
Lec 13	Bacterial cell morphology. Structure and function: plasma membranes – cell compartmentation.	2
Lec 14	Credit – first attempt.	2
Lec 15	Credit – second attempt.	2
Total hours		30
Form of classes - laboratory		Number of hours
Lab 1 Lab 2	Rules of lab credits. Rules of safety and work in microbial lab. Principles of operation of lab equipment and location of the particular tools (Koch apparatus, autoclave, dryers and shakers. Description of basic microbiological tools, Petri dishes, inoculation loops, spreaders, pipets and tubes.	2+2
Lab 3 Lab 4	Teaching of sterile work with bacteria. Sterile passing of bacteria from liquid into solid media and vice versa.	2+2
Lab 5 Lab 6	Solid media preparations: plates and slants. Technics of the loop and spreader applications to culture bacteria on different media (spreading bacterial lawn, streak culture) .	2+2
Lab 7 Lab 8	Pure cultures isolation. Different isolation technics: with inoculating loop or spreader – solid media cultivation.	2+2
Lab 9 Lab 10	Bacterial growth curve – cells counting. Evaluation of a bacterial cells number by different methods: dilution series or spectrophotometry.	2+2

Lab 11 Lab 12	Different growth and cultivation types. Cultivation of chosen bacterial strains on liquid media with the surfactant adds (Tween 80). Comparison of the bacterial growth lawn on and inside the solid media – colony morphology.	2+2
Lab 13 Lab 14	Morphology of bacterial cells. Different types of bacteria staining. Simple staining – microscopic observation of prepared samples. Simple staining – microscopic observation of prepared samples. Complex staining – Gram staining – microscopic observation of G(+) and G(-) bacteria.	2+2
Lab 15	Credit – first attempt. Experimental and theoretical part.	2
		Total hours
30		
TEACHING TOOLS USED		
N1	Multimedia presentation	
N2	Individual laboratory work	
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
P (lecture)	PEK_W01- PEK_W05	Colloquium – final test
P (laboratory)	PEK_U01 – PEK_U04	Colloquium – final test
PRIMARY AND SECONDARY LITERATURE		
<u>PRIMARY LITERATURE:</u>		
[1] P. Ketchum et al „Microbiology – Concepts and applications”		
[2] Michael T. Madigan et al “Biology of Microorganisms”		
[3] „Mikrobiologia” ; H.G. Schlegel		
<u>SECONDARY LITERATURE:</u>		
[1] „Życie bakterii” W. Kunicki-Goldfinger,		
[2] „Bakterie w biologii, biotechnologii i medycynie” P. Singleton,		
SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)		
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