



Subject card

Subject name and code	General Mikrobiology, PG_00054680						
Field of study	Biotechnology						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	1	Language of instruction			Polish		
Semester of study	1	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Department of Microbiology -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Anna Brillowska-Dąbrowska					
	Teachers	dr hab. inż. Marta Wanarska dr hab. inż. Anna Brillowska-Dąbrowska Magdalena Burzyńska dr hab. inż. Hubert Cieśliński dr inż. Martyna Mroczyńska-Szeląg dr hab. inż. Lucyna Holec-Gąsior					
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	30.0	0.0	0.0	60
	E-learning hours included: 0.0						
Adresy na platformie eNauczanie: Mikrobiologia ogólna - Moodle ID: 18486 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18486							
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	SUM
	Number of study hours	60		8.0		32.0	100
Subject objectives	Obtaining knowledge on the basic problems of microbiology, mainly in the field of microbiology used in biotechnology. Mastering the practical skills of performing selected microbiological techniques, especially those used in biotechnology.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	K6_U04		The student acquires the ability to use basic microbiological techniques.		[SU4] Assessment of ability to use methods and tools		
	K6_W04		The student learns about the biology, physiology and functions of microorganisms.		[SW1] Assessment of factual knowledge		

Subject contents	<p>LECTURE Microorganisms and microbiology. Microorganisms as cells. Microorganisms and their natural environments. The influence of microorganisms on humans. A history of discoveries in microbiology. Overview of the life forms of microorganisms (cell structure and life evolution, three domains of life, physiological diversity of microorganisms, biodiversity of prokaryotes and eukaryotic microorganisms). Cell structure and function (microscopy and cell morphology, cell membranes, cell walls, surface structures and inclusions, cell movement). Nutrition, laboratory culture and metabolism of microorganisms. Microbial growth (bacterial cell division, growth of bacterial populations, measuring microbial growth, environmental effects on microbial growth). Molecular biology of microorganisms (genes and gene expression, DNA structure, DNA replication, DNA manipulation tools, RNA synthesis, protein biosynthesis). Metabolism regulation (regulation of enzyme activity, DNA-binding proteins and transcription regulation, general regulation mechanisms, other regulation mechanisms). Virology (virus and virion, growth and quantification, viral replication, viral diversity). Bacterial genetics (mutations and recombination, transformation, transduction, plasmids, transposons and insertion sequences, bacterial genetics and gene cloning, bacterial chromosome). Microbiological taxonomy. Bacterial filogenza. Archaea phylogeny. Cell biology of eukaryotic microorganisms. Microbiological ecology (cycle of carbon, nitrogen, phosphorus, sulfur and microorganisms, nitrogen fixation, water microbiology, pathogenic microorganisms in waters, coliform bacteria as indicators of the sanitary condition of the aquatic environment, sources of microbiological contamination of food, pathogenic microorganisms in food). Microorganisms useful for industry and research. LABORATORY Organization of the microbiological laboratory. Safety of work with microorganisms - risk groups. Sterilization and disinfection (basics of sterilization and disinfection, sterilization with physical agents, chemical disinfection). Cultivation of microorganisms (growth curve, culture media). Nutritional requirements. Microorganisms in the laboratory environment (colony morphology, growth types in the medium, agar media, slants and bars). Techniques of obtaining pure cultures (surface plating technique, reduction inoculation, specific media). Environmental factors influencing microbial growth (temperature, pH, osmotic pressure, ultraviolet light). Oxygen requirements of microorganisms - anaerobic cultures. Quantitative analysis of bacteria. Antimicrobial factors. The metabolism of microorganisms (hydrolysis of starch, fats, proteins, fermentation and -galactosidase activity). Interactions between microorganisms (commensalism, synergism, antagonism). Microscopic techniques and staining of bacteria (Gram staining). Identification of unknown bacteria from environmental samples. Genetics of microorganisms (plasmid DNA isolation, transformation).</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Two lecture's tests	60.0%	10.0%
	Final exam	60.0%	60.0%
	Quizzes during all of the laboratory classes(laboratories)	60.0%	30.0%
Recommended reading	Basic literature	Jaime S. Colome, A. M Kubinski, Raul Cano, D. V. Grady Laboratory Exercises in Microbiology	
	Supplementary literature	Michael Madigan "Biology of microorganisms" - Pearson; 16th edition (1 July 2021)	
	eResources addresses	Mikrobiologia ogólna - Moodle ID: 18486 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=18486	
Example issues/ example questions/ tasks being completed	1. The generation time is: the time required for cell division the time required to break down genetic material time of logarithmic growth of bacteria in stationary culture the time required for bacteria to adapt to the new environment 2. Anaerobes: they grow in microaerophilic conditions they grow in the presence of 21% oxygen in the atmosphere they grow in anaerobic conditions they do not grow in anaerobic conditions		
Work placement	Not applicable		