



## Subject card

Subject name and code	, PG_00037562						
Field of study	Green Technologies						
Date of commencement of studies	October 2020		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	2		Language of instruction		English		
Semester of study	4		ECTS credits		4.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. inż. Anna Brillowska-Dąbrowska				
	Teachers		dr hab. inż. Anna Brillowska-Dąbrowska  dr hab. inż. Roman Kotlowski				
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:						
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		5.0		35.0	100
Subject objectives	The aim of the course is to acquaint students with the theoretical foundations of general microbiology and basic techniques applied in microbiological laboratories. This knowledge will enable both the understanding of natural processes involving microorganisms and their practical use. In addition, enable the design and conduct experiments on the identification of microorganisms and to carry out their characteristics.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K6_W04] is aware of the importance of environmental protection and has a basic knowledge of chemical and biological threats to the environment, with particular emphasis on anthropogenic factors, has a basic knowledge of knowledge of the principles of sustainable development as well as national and European environmental management conditions.		The graduate knows the rules for classifying microorganisms. He knows and understands the basic requirements of microorganisms. He can characterize the benefits and threats that various groups of microorganisms bring to humans and environment.		[SW1] Assessment of factual knowledge		
	[K6_U04] capable of formulating and solving design tasks in the field of environmental technology to recognize their non-technical aspects, including environmental, economic and legal. Is capable of applying the principles of occupational health and safety. Is able to make initial assessment of engineering solutions and actions		The graduate can indicate the importance of microorganisms. The graduate understands the methodology of the works used in microbiology. The graduate knows methods of combating microorganisms.		[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		

Subject contents	<p>Introduction to general microbiology – 2 h.</p> <p>Characteristics and classification of microorganisms – 2 h.</p> <p>Growth of microorganisms – 2 h.</p> <p>Microorganism – health, disease -2 h.</p> <p>Impact of microorganisms – 2 h.</p> <p>Principles of isolation, cultivation and identification of microorganisms - 2 h.</p> <p>Basic techniques used in microbiology, macroscopic and microscopic observation – 2 h.</p> <p>Nutritional requirements of microbial cells – microbial metabolism based identification – 2 h.</p> <p>Test – 1 h</p> <p>Antimicrobial agents – 2 h.</p> <p>Introduction to genetics of microorganisms – 2 h.</p> <p>Molecular biology techniques in microbiology laboratory -4 h.</p> <p>Immunodetection In microbiology laboratory - 2 h.</p> <p>Identification of unknown microorganisms in microbiology laboratory -2 h</p> <p>Test – 1 h</p> <p>LABORATORIES:</p> <p>Exercise 1. Safety and rules in the laboratory of microbiology</p> <p>Exercise 2. Working conditions in the laboratory - sterilization and disinfection.</p> <p>Exercise 3. Cultivation of microorganisms.</p> <p>Exercise 4. Macroscopic and microscopic observations..</p> <p>Exercise 5. Gram staining of microorganisms.</p> <p>Exercise 6. Gram staining of microorganisms - bacteria, yeasts and molds.</p> <p>Exercise 7. Gram staining of microorganisms - test.</p> <p>Exercise 8. The impact of external conditions on the cultivation of microorganisms.</p>
------------------	---

	Exercise 9. Antibiotics.		
	Exercise 10. Bacteria counting.		
	Exercise 11. Isolation of genomic DNA - the different methods, the measurement of the concentration of DNA, electrophoresis.		
	Exercise 12. Macro-and microscopic observations(species identification).		
	Exercise 13. Purification of genomic DNA and PCR (identification of the species).		
	Exercise 14. Checking and preparation of PCR products for sequencing (species identification).		
	Exercise 15. Discussion of the results of sequencing (species identification).		
Prerequisites and co-requisites	"Environmental biology" completed		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test II lecture	60.0%	5.0%
	Test I lecture	60.0%	5.0%
	Short tests	60.0%	40.0%
	Final test	60.0%	50.0%
Recommended reading	Basic literature	M.T. Madigan "Brock Biology of Microorganisms" - 12th Edition, Pearson  A.E. Brown "Benson"s Microbiological Applications: General Microbiology, Short Version", 11th Edition, McGraw-Hill Science Engineering  E. Rosenberg, U. Gophna(Eds.) "Beneficial Microorganisms in Multicellular Life Forms" - Springer  J. T. Satyanarayana, N. Bhavdish, P. Anil (Eds.) "Microorganisms in Environmental Management"  M.T. Madigan "Brock Biology of Microorganisms" - 12th Edition, Pearson  A.E. Brown "Benson"s Microbiological Applications: General Microbiology, Short Version", 11th Edition, McGraw-Hill Science Engineering  E. Rosenberg, U. Gophna(Eds.) "Beneficial Microorganisms in Multicellular Life Forms" - Springer  J. T. Satyanarayana, N. Bhavdish, P. Anil (Eds.) "Microorganisms in Environmental Management" Springer  Practicals - Technical University of Gdansk: "Microbiology"	
	Supplementary literature	n/a	
	eResources addresses		

Example issues/ example questions/ tasks being completed	1. Methods for identification of bacteria  2. Application of PCR in the laboratory of microbiology
Work placement	Not applicable