



## Subject card

Subject name and code	General microbiology, PG_00057767						
Field of study	Green Technologies						
Date of commencement of studies	October 2022		Academic year of realisation of subject		2022/2023		
Education level	first-cycle studies		Subject group		Optional subject group 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		English		
Semester of study	2		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						
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						
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 gain the theoretical foundations of general microbiology and the basic techniques used in microbiology laboratories. The acquired knowledge will allow both understanding of the processes occurring in nature with the participation of microorganisms, as well as their practical use. In addition, it will enable the design and conduct of experiments on the identification of microorganisms and their characterization.						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[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 is able to indicate the importance of microorganisms. The graduate understands the methodology of works used in microbiology.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
	[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 principles of the classification of microorganisms. Knows and understands the basic requirements of microorganisms. Is able to characterize the benefits and threats of particular groups of microorganisms for humans and the environment.	[SW1] Assessment of factual knowledge
	[K6_W03] has a basic knowledge of soil, air and water pollutants, design and supervision of environmentally friendly technologies and technologies which do not produce waste, knows technology of cleaning and neutralization of industrial waste and wastewater management, has a basic understanding of the theoretical basis of methods and types of apparatus used in chemical analysis of environmental pollutants	The graduate is able to collect environmental samples for microbiological analysis and analyze them	[SW3] Assessment of knowledge contained in written work and projects
	[K6_U02] is able to operate equipment and perform typical analyzes of studies of environmental pollution, is able to carry out an analysis of typical environmental pollution and simple devices according to specification	The graduate knows the equipment necessary for the work of a microbiological laboratory	[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject
	[K6_K02] is aware of the social role of a technical college graduate, take the reflections on the ethical, scientific and social aspects of the work performed, understands the need to promote, formulating and providing the public with information and opinions concerning the activities of the profession of engineer.	The graduate can analyze various aspects of tasks performed in microbiological laboratories	[SK3] Assessment of ability to organize work

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

	<p>Exercise 9. Antibiotics.</p> <p>Exercise 10. Bacteria counting.</p> <p>Exercise 11. Isolation of genomic DNA - the different methods, the measurement of the concentration of DNA, electrophoresis.</p> <p>Exercise 12. Macro-and microscopic observations(species identification).</p> <p>Exercise 13. Purification of genomic DNA and PCR (identification of the species).</p> <p>Exercise 14. Checking and preparation of PCR products for sequencing (species identification).</p> <p>Exercise 15. Discussion of the results of sequencing (species identification).</p>		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Short tests (laboratories)	60.0%	50.0%
	Test I lecture	60.0%	25.0%
	Test I lecture	60.0%	25.0%
Recommended reading	Basic literature	<p>M.T. Madigan Brock Biology of Microorganisms - 12th Edition, Pearson</p> <p>A.E. Brown "Benson"s Microbiological Applications: General Microbiology, Short Version", 11th Edition, McGraw-Hill Science Engineering</p> <p>E. Rosenberg, U. Gophna(Eds.) "Beneficial Microorganisms in Multicellular Life Forms" - Springer</p> <p>J. T. Satyanarayana, N. Bhavdish, P. Anil (Eds.) "Microorganisms in Environmental Management"</p> <p>M.T. Madigan Brock Biology of Microorganisms - 12th Edition, Pearson</p> <p>A.E. Brown "Benson"s Microbiological Applications: General Microbiology, Short Version", 11th Edition, McGraw-Hill Science Engineering</p> <p>E. Rosenberg, U. Gophna(Eds.) "Beneficial Microorganisms in Multicellular Life Forms" - Springer</p> <p>J. T. Satyanarayana, N. Bhavdish, P. Anil (Eds.) "Microorganisms in Environmental Management" Springer</p> <p>Practicals - Technical University of Gdansk: "Microbiology"</p>	
	Supplementary literature	not applicable	

	eResources addresses	Adresy na platformie eNauczenie: General microbiology - Moodle ID: 29073 <a href="https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29073">https://enauczenie.pg.edu.pl/moodle/course/view.php?id=29073</a>
Example issues/ example questions/ tasks being completed	1. Bacteria identification methods  2. Application of PCR in a microbiological laboratory	
Work placement	Not applicable	

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