



## Subject card

Subject name and code	General microbiology, PG_00057613						
Field of study	Green Technologies						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2023/2024		
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			Polish		
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. Beata Krawczyk					
	Teachers	dr inż. Ilona Kłosowska-Chomiczewska dr inż. Aneta Pacyna-Kuchta dr hab. Beata Krawczyk					
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 familiarize the student with laboratory techniques used in the microbiology laboratory and acquire knowledge about their functions in the environment.						

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.	He knows the impact of microorganisms on the environment of plants, animals and humans and vice versa.	[SW1] Assessment of factual knowledge
	[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 student perceives the changes that occur in the environment and understands the necessity to stop them.	[SK5] Assessment of ability to solve problems that arise in practice
	[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	He is aware of environmental protection	[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	He knows the rules of safe work in a microbiological laboratory. The student has gained knowledge about conventional and molecular methods in microbiology and is able to choose the appropriate one for his purpose.	[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject
	[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 student can use the methods and tools typical for the microbiological laboratory, the student can manipulate and transfer bacteria and cultures, know aseptic techniques	[SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment [SU4] Assessment of ability to use methods and tools

Subject contents	<p><b>Lecture:</b></p> <p>Why do we study microbiology?. Classification and identification of microorganisms. The modern classification of Prokaryotes. Fields and history of Microbiology. Koch's postulates. Microscopy and staining of bacteria. Nutrition of microorganisms, growth of the microorganisms (growth phases, cultures of microorganisms, obtaining pure cultures, culture media, special culture techniques, storage of cultures. Measurement of microbial growth. Control of microbial growth, sterilization and disinfection. Molecular diagnostics of microorganisms. Microbial ecology. Host-microorganism relations.</p> <p><b>Laboratory:</b></p> <p>Principles of safe work in a microbiological laboratory, work in sterile conditions (organisational exercise 1); Acquisition of pure bacterial cultures from mixed cultures evaluation of 3 techniques. Influence of temperature on dye production; Inoculation on selectively differentiating media and macroscopic observations; Physiological characteristics of bacteria: Hydrolytic reactions; Physiological characterization of bacteria: Fermentation tests and oxidation tests; Bacterial metabolism: Entero tube test for Enterobacteriaceae; Winogradzki column - preparation; Influence of the environment and control of microbial growth: Determination of the optimal temperature for bacterial growth and determination of the time of thermal death of bacteria; Study of the effect of UV radiation on bacteria; Effect of osmotic pressure and heavy metals on bacteria; antimicrobial susceptibility tests; disc test (antibiogram); Determination of bacterial susceptibility to onion and garlic phytoncides; Evaluation of the impact of disinfectants on microorganisms; Environmental Water Purity Test. Selective and differential media for the identification of coliforms; Interrelationships between microorganisms: Bacterial synergism, metabiosis; the symbiosis of bacteria and fungi in kefir; Winogradzki column: observations and microscopic preparations</p>											
Prerequisites and co-requisites	Knowledge of the structure of the bacterial cell.											
Assessment methods and criteria	<table border="1" data-bbox="448 860 1487 965"> <thead> <tr> <th data-bbox="448 860 794 898">Subject passing criteria</th> <th data-bbox="794 860 1141 898">Passing threshold</th> <th data-bbox="1141 860 1487 898">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 898 794 927">test</td> <td data-bbox="794 898 1141 927">60.0%</td> <td data-bbox="1141 898 1487 927">50.0%</td> </tr> <tr> <td data-bbox="448 927 794 965">sprawdzian, sprawozdanie</td> <td data-bbox="794 927 1141 965">60.0%</td> <td data-bbox="1141 927 1487 965">50.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	test	60.0%	50.0%	sprawdzian, sprawozdanie	60.0%	50.0%
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Recommended reading	Basic literature	<p>Mikrobiologia ogólna podręcznik akademicki A.Brillowska-Dabrowska, L.Holec-Gąsior, M. Olszewski, K.Werbowy, J. Kur Wydawnictwo PG, 2009</p> <p>Krawczyk B. i in. Wybrane zagadnienia z mikrobiologii klinicznej i środowiskowej teoria i ćwiczenia laboratoryjne wyd. PG, 2019</p>										

	Supplementary literature	<ul style="list-style-type: none"> <li>• Mikrobiologia środowisk Mieczysław K. Błaszczyk. Wydawnictwo Naukowe Pwn. 2020.</li> <li>• Mikrobiologia Jadwiga Baj. Wydawnictwo Naukowe PWN</li> <li>• Mikrobiologia ogólna H.G. Schlegel; Wydanie 2: Warszawa, 2008; PWN.</li> <li>• Mikrobiologia ogólna Rippel-Baldes; PWN, Warszawa</li> <li>• Życie bakterii Kunicki Goldfinger W. Wydawnictwo PWN, Warszawa; 2007</li> <li>• Podstawy biologii komórki B. Alberts, D. Bray i in. Wydawnictwo Naukowe PWN; 2016</li> <li>• Bakterie w biologii, biotechnologii i medycynie P. Singleton. Wydawnictwo PWN Warszawa; 2000</li> <li>• Prescotts Microbiology Willey JM., Sherwood LM., Woolverton CJ. 8 edition Press: Mc Graw Hill</li> <li>• Microbiology R. Bauman . Wydawca Pearson/Benjamin Cummings, 2004</li> <li>• Mikrobiologia Murray R. Patrick Ken S. Rosenthal Michael A. Pfaller . Wydawnictwo Urban &amp; Partner</li> <li>• Mikrobiologia środowiska Anna Kostka Wydawnictwa AGH, 2014 - 360</li> <li>• Wybrane zagadnienia z mikrobiologii klinicznej i środowiskowej. Teoria i ćwiczenia laboratoryjne</li> <li>• skrypt B. Krawczyk, R. Kotłowski, M. Śpibida, M. Wysocka. Wyd. PG</li> <li>• Mikrobiologia ogólna A. Brillowska-Dąbrowska, L. Holec-Gąsior, M. Olszewski, K. Werbowy, J. Kur wyd. PG</li> </ul> <p><b>on-line books</b></p> <ul style="list-style-type: none"> <li>• <a href="https://www.ncbi.nlm.nih.gov/books/NBK7627">https://www.ncbi.nlm.nih.gov/books/NBK7627</a></li> <li>• <a href="https://openstax.org/details/books/microbiology">https://openstax.org/details/books/microbiology</a></li> <li>• <a href="http://www.grsmu.by/files/file/university/cafedry/mikrobiologii-virysologii-immynologii/files/essential_microbiology.pdf">http://www.grsmu.by/files/file/university/cafedry/mikrobiologii-virysologii-immynologii/files/essential_microbiology.pdf</a></li> <li>• <a href="https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1015&amp;context=qboers">https://academicworks.cuny.edu/cgi/viewcontent.cgi?article=1015&amp;context=qboers</a></li> </ul>
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none"> <li>• How environmental water is tested due to microbiological contamination?</li> <li>• How do you obtain pure bacterial cultures?</li> <li>• What is the influence of the environment on microbial growth?</li> </ul>	
Work placement	Not applicable	