



Subject card

Subject name and code	Instrumental techniques in environmental biology, PG_00043560						
Field of study	Green Technologies						
Date of commencement of studies	February 2023		Academic year of realisation of subject		2023/2024		
Education level	second-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	2		ECTS credits		5.0		
Learning profile	general academic profile		Assessment form		assessment		
Conducting unit	Department of Chemistry, Technology and Biochemistry of Food -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor		dr inż. Izabela Koss-Mikołajczyk				
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	0.0	15.0	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		60.0	125	
Subject objectives	Acquainting students with microorganisms inhabiting the environment. Learning instrumental techniques (spectroscopic, chromatographic, molecular biology techniques) for assessing the interaction of the environment and the microorganisms inhabiting it.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[K7_U02] able to operate equipment and perform typical analyzes of studies of environmental pollution and design and oversee the environmentally friendly technologies and zero-waste technologies, can perform expert on the environmental impact of technology already working		The student knows how to use specialized analytical equipment to determine specific parameters.		[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 [SU5] Assessment of ability to present the results of task		
	[K7_W01] a broader and deeper knowledge of certain branches of mathematics, including elements of applied mathematics and optimization methods including mathematical methods, useful to formulate and solve complex tasks in the field of environmental technologies and modern analytical methods		Can interpret the obtained research results and make their statistical analysis.		[SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects [SW2] Assessment of knowledge contained in presentation		
	[K7_K03] can consciously and supported by the experience to present your work, provide information in a manner commonly understood, to communicate, to make self-assessment and constructive criticism of the work of others, the reasons for different points of view		The student is able to make a critical review of the literature on a given topic and prepare presentations based on it.		[SK3] Assessment of ability to organize work [SK2] Assessment of progress of work [SK5] Assessment of ability to solve problems that arise in practice		

Subject contents	LECTURE: Fundamentals of environmental biology. Microorganisms inhabiting the environment. The impact of environmental pollution on microorganisms that live in it. Microbiological techniques in environmental biology. Basic issues of biohydrometallurgy, biocorrosion and bioremediation. Application of atomic absorption spectroscopy, chromatographic and spectroscopic techniques and molecular biology techniques in environmental biology. SEMINAR: The impact of GMO crops on the environment. The influence of the environment on the cultivation of GMOs. Phytoremediation. Bioremediation. Alternative plant protection products. The use of effective microorganisms in agriculture. Microorganisms and climate change. Influence of pesticides on soil microorganisms. Degradation of endocrine compounds by soil organisms. The influence of the presence of antibiotics in the environment on soil microorganisms. The influence of pollutants on water microorganisms. Self-purification of surface waters. The influence of nutrition on the gut microbiome. The influence of the environment on the gut microbiome. LABORATORY: Microbiological methods of air purity assessment. The use of high performance thin layer chromatography (HPTLC) for the qualitative analysis of pesticides in samples of animal origin. Application of the comet test to determine the genotoxic effect of environmental pollutants. The use of molecular biology techniques in biomonitoring. Techniques for determining the microbiological purity of water.		
Prerequisites and co-requisites	<ul style="list-style-type: none"> • Basic knowledge of analytical chemistry • Basic knowledge of microbiology 		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	wejściówki i sprawozdania	60.0%	10.0%
	Kolokwium	60.0%	70.0%
	prezentacja	60.0%	20.0%
Recommended reading	Basic literature	<ol style="list-style-type: none"> 1. Namiesnik J., Jamrogiewicz Z., Pilarczyk M., Torres L. Przygotowanie próbek środowiskowych do analizy. Wydawnictwo Naukowo-Techniczne. 2. Muszynski A. Elementy biotechnologii w inżynierii środowiska. Oficyna Wydawnicza Politechniki Warszawskiej 3. Namiesnik J. Metody Instrumentalne w kontroli zanieczyszczeń środowiska. Politechnika Gdanska 4. Riedl T. Biologia Środowiska. Akademia Wychowania Fizycznego w Gdansk. Wydawnictwo Uczelniane. 5. Olanczuk-Neyman K. Laboratorium z Biologii Środowiska. Politechnika Gdanska. 6. Zalewska-Piatek B. Biologia środowiska. 7. Klimiuk E., Łebkowska M. Biotechnologia w Ochronie Środowiska. 	
	Supplementary literature	<ol style="list-style-type: none"> 1. da Silva, S., Goncalves, I., Gomes de Almeida, F. C., Padilha da Rocha e Silva, N. M., Casazza, A. A., Converti, A., & Asfora Sarubbo, L. (2020). Soil Bioremediation: Overview of Technologies and Trends. <i>Energies</i>, 13(18), 4664. 2. Nguyen, B. A. T., Hsieh, J. L., Lo, S. C., Wang, S. Y., Hung, C. H., Huang, E., ... & Huang, C. C. (2020). Biodegradation of dioxins by Burkholderia cenocepacia strain 869T2: Role of 2-haloacid dehalogenase. <i>Journal of Hazardous Materials</i>, 401, 123347. 3. Franco-Duarte, R., Cernakova, L., Kadam, S., S Kaushik, K., Salehi, B., Bevilacqua, A., ... & Relison Tintino, S. (2019). Advances in chemical and biological methods to identify microorganisms - from past to present. <i>Microorganisms</i>, 7(5), 130. 4. Karlsson, R., Gonzales-Siles, L., Boulund, F., Svensson-Stadler, L., Skovbjerg, S., Karlsson, A., & Moore, E. R. (2015). Proteotyping: Proteomic characterization, classification and identification of microorganisms - A prospectus. <i>Systematic and Applied Microbiology</i>, 38(4), 246-257. 	
	eResources addresses	Adresy na platformie eNauczanie:	

Example issues/ example questions/ tasks being completed	<ul style="list-style-type: none">• Bioremediation• Biohydrometalurgia• Self-purification of surface waters• Biodegradation• Effective microorganisms
Work placement	Not applicable