GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Instrumental techniques in environmental biology, PG_00043560		
Field of study	Green Technologies		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
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	1	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 the assessment of the interaction of the environment and the microorganisms inhabiting it.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[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	Student can interpret the obtained results and make their statistical analysis.	[SW1] Assessment of factual knowledge [SW2] Assessment of knowledge contained in presentation [SW3] Assessment of knowledge contained in written work and projects
[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.	[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 [SU5] Assessment of ability to present the results of task
[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 literature review on a given topic and prepare presentation based on them.	[SK3] Assessment of ability to organize work [SK5] Assessment of ability to solve problems that arise in practice [SK1] Assessment of group work skills

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 spectroscopicd 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. Biotoremediation. 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. Application of high performance thin layer chromatography (HPTLC) for the qualitative analysis of pesticides in samples of animal origin. Application of the comet assay to determine the genotoxic effect of environmental pollutants. The use of molecular biology techniques in biomonitoring. Techniques for determining microbiological purity of water.
Prerequisites and co-requisites	• Basic knowledge of analytical chemistry • Basic knowledge of microbiology

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Seminar	60.0%	20.0%
Lecture	60.0%	70.0%
Laboratory excersise	60.0%	10.0%

Recommended reading

Basic literature	1. Raina M.M., Pepper I.L., Gerba C.P. Environmental Microbiology 2. Hurst C.J., Garland J.L., Mills A.L., Crawford R.L., Lipson D.A., Stetzebach L.D. Manual of environmental mikrobiology. 3. Polymerase Chain Reaction: Applications in Environmental Microbiology. Ann. Rev. Microb. Vol. 45, pp 137-161, 1991
Supplementary literature	1. da Silva, S., Gonçalves, 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. Energies, 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. Journal of Hazardous Materials, 401, 123347. 3. Franco-Duarte, R., Černáková, 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. Microorganisms, 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. Systematic and Applied Microbiology, 38(4), 246-257.
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed	Bioremediation Biohydrometallurgy Biodegradation Effective microorganisms
Work placement	Not applicable