



Subject card

Subject name and code	Environmental Biology, PG_00036262						
Field of study	Green Technologies						
Date of commencement of studies	October 2021	Academic year of realisation of subject			2021/2022		
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			5.0		
Learning profile	general academic profile	Assessment form			exam		
Conducting unit	Department of Microbiology -> Faculty of Chemistry						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Beata Zalewska-Piątek					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	30.0	0.0	0.0	45
	E-learning hours included: 0.0						
	Adresy na platformie eNauczenie:						
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	45	15.0		65.0	125	
Subject objectives	The aim of the course of Environmental biology is to broaden knowledge in the field of basic biology with the molecular elements, ecotoxicology, environmental protection through the introduction of a number of selected topics.						
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	Student performs a toxicity test on plants to verify the state of the soil environment.			[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information		
	[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.	Student analyzes anthropogenic factors causing pollution of abiotic elements of the environment: water, air and soil.			[SW3] Assessment of knowledge contained in written work and projects		

Subject contents	<p>LECTURE</p> <p>Explanation of the term of biology and environmental biology. The development of biology at the turn of the centuries. Characteristics of selected groups of organisms inhabiting the biosphere. Prokaryotic and eukaryotic organisms, cellular structure. Bacteria, structure, size and morphological forms. Major cell structures of bacteria. General characteristics of fungi. The main groups of fungi of useful meaning. Genome as a total genetic information of the cell. Prokaryotic and eukaryotic genomes. Mutations, mutagens and environmental mutagenesis. Evaluation of genotoxic effects caused by environmental pollutions (tests detecting point mutations - Ames test, cytogenetic and molecular tests – micronucleus method, comet assay, Tunnel test, fluorescent <i>in situ</i> hybridization, FISH). Biomarkers. Classification of biomarkers. Inhibition of acetylcholinesterase (AChE) and dehydratase of aminolevulinic acid (ALAD). Reduction of coagulation proteins activity. Induction of witelogenine and monooxygenases. Porphyrin profiles and heme synthesis. Basics of ecotoxicology. Toxic substances and measurable toxicity effects (LC₅₀, LD₅₀, NOED, NOEC, EC₅₀, ED₅₀). Features of the test organisms. Bioindication as a method of environmental quantification. Classification and review of bioindicators (natural and culture species). Toxicity classification system, screening test and dilution test for analysis of environmental samples (classes of samples). Review of toxicity tests based on continental and aquatic organisms. Toxicity tests based on the forms of crypto-biotic bioindicators. Lichen as the bioindicators of air pollution. Pollution sensitivity of lichens. the Lichen scale and transplantation of lichen thallus. The importance of lichens in nature and human economy.</p> <p>LABORATORY</p> <p>Organizational classes. Familiarization with the regulations of health and safety of work (BHP) in the laboratory and proceedings with biological material. The basics of <i>in vitro</i> cultivation of microorganisms on solid and liquid media. Types of microbial growth and culture methods. Extraction and analysis of plasmid DNA isolated from the bacterial cells. Enumeration methods determining the number of microorganisms in natural environments. Enumeration of bacteria by the methods of surface and deep growth (standard plate count). Determination of the number of microorganisms in the examined material by the titer (bacterial index) and NPL methods. Basics of microscopy and preparation of slides for microscopic analyzes – the structure of prokaryotic and eukaryotic cells. Selected staining methods (Gram and Giemsa staining) - differentiation of Gram-negative and Gram-positive bacteria and analysis of eukaryotic cells. Microbiological analysis in the assessment of the sanitary condition of soil, water and air. Analysis of the degree toxicity of soil environment in relation to the test plant species - phytotoxicity microbiotest (Phytotoxkit). Summary of the results obtained.</p>											
Prerequisites and co-requisites	Preliminary demands not required.											
Assessment methods and criteria	<table border="1"> <thead> <tr> <th>Subject passing criteria</th> <th>Passing threshold</th> <th>Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>There is the composite mark including laboratory and lecture. FINAL SCORE (%) = Laboratory score - tests and laboratory reports (%) x 0.5 + Lecture score - test (%) x 0.5.</td> <td>60.0%</td> <td>100.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	There is the composite mark including laboratory and lecture. FINAL SCORE (%) = Laboratory score - tests and laboratory reports (%) x 0.5 + Lecture score - test (%) x 0.5.	60.0%	100.0%			
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Example issues/ example questions/ tasks being completed	Characteristics of selected group of organisms inhabiting the biosphere. The structure of prokaryotic and eukaryotic cells. Mutations, mutagens and environmental mutagenesis. Analysis of genotoxic effects caused by environmental pollutions based on toxicity tests. Basics of microscopy and sample preparation for microscopic analyses.
Work placement	Not applicable