1.	**Field of study**	**Biotechnology**
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2019/2020 (winter term)
4.	Level of qualifications/degree	first-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

Module: Biotechnology methods in environmental protection

Module code: 1BT_27

1. Number of the ECTS credits: 5

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
1BT_27_1	Student defines and describes the basic concepts and terms used in environmental biotechnology.	1BT_W02_P	4
1BT_27_2	Student possesses a basic knowledge of the methods used in the bioremediation of polluted environments.	1BT_W09_P	5
1BT_27_3	Student enumerates and characterizes microorganisms of industrial importance.	1BT_W05_P	5
1BT_27_4	Student explains and describes the physical and chemical phenomena that occur in nature.	1BT_W02_P 1BT_W04_P	4 4
1BT_27_5	Student performs physico-chemical and microbiological analysis of the environmental samples under the tutor supervision.	1BT_U04_P	5
1BT_27_6	Student describes the effects of the experiment, analyzes the results, and draws the conclusions.	1BT_U02_P	5
1BT_27_7	Student follows the rules of laboratory work and cares about the safety of others.	1BT_K04_P	5
1BT_27_8	Student demonstrates the ability for individual and team work.	1BT_U04_P	5

3. Module description

Description	Student learns aerobic and anaerobic processes in biotechnology, biotechnological methods for recovery of metal and mineral raw materials, as well as mechanisms involved in xenobiotic detoxification by microorganisms. The module provides the knowledge of the methods for the treatment of contaminated environments. Particular emphasis is placed on the biological methods for soil remediation (bioremediation of soil using mycorrhizal fungi), water treatment (activated sludge process and biological bed) and solid wastes treatment. In addition, student learns and ran onto the basic methods for the determination of physico-chemical and microbiological quality of wastewater and sludge, and methods allowing control of the number of selected groups of bacteria. Furthermore, this module familiarizes students with the principles of work in a specialized laboratory. Laboratory classes improve their ability to analyze and interpret results of the conducted experiments.

Prerequisites	Implementation of the learning outcomes of the modules on chemistry, biochemistry, cell biology, microbiology and bases of biotechnology.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
1BT_27_w_1	Colloquium	Written work verifying the level of knowledge and skills acquired during the laboratory classes.	1BT_27_1, 1BT_27_2, 1BT_27_3, 1BT_27_4
1BT_27_w_2	Continuous evaluation of practical skills	Evaluation of following the rules of laboratory work by a student, continuous evaluation of student skills in the use of laboratory equipment, evaluation of the ability to perform experiments according to the protocol, analyses of the results, drawing conclusions.	1BT_27_5, 1BT_27_6, 1BT_27_7, 1BT_27_8
1BT_27_w_3	Report of the laboratory classes	Students, as a team, prepare a report, describing the experiment, results and conclusions.	1BT_27_1, 1BT_27_2, 1BT_27_6
1BT_27_w_4	Exam	Written work verifying the level of understanding of the information acquired during the lectures. One condition for admission of a student to the exam is to pass the laboratory classes and the report.	1BT_27_1, 1BT_27_2, 1BT_27_3, 1BT_27_4

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
1BT_27_fs_1	lecture	Lectures with the use of the various audiovisual aids.	15	Student learns the knowledge from the lectures, reading of scientific literature and electronic sources connected with the issues taught.	10	1BT_27_w_4
1BT_27_fs_2	laboratory classes	Individual or group work in a Biochemistry lab under the tutor’s supervision, performing of the experiments according to the instructions, analysis of the results. Consultation: Work with the Individual students in order to prepare a report from the laboratory classes	45	Preparation to the classes using recommended literature and instructions, revision and consolidation of the knowledge required to pass the test, report elaboration.	50	1BT_27_w_1, 1BT_27_w_2, 1BT_27_w_3