1.	**Field of study**	**Biotechnology**
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2025/2026 (winter term)
4.	Level of qualifications/degree	first-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

7.	**General information about the module**
Module name	**Principles of biotechnology**
Module code	1BT_23_43
Number of the ECTS credits	6
Language of instruction	
Purpose and description of the content of education	The module provides knowledge of the basic methods used in the biotechnology of microorganisms and plants and recognizes their benefits and risks. It defines the methodological basis of protoplast and anther cultures, and genetic transformation of plants. It demonstrates the screening and application of microorganisms, including genetically modified ones, in synthesizing biomaterials, primary and secondary metabolites, remediation of degraded environments, biological methods of energy generation, and implementation of environmentally friendly technologies. Laboratory classes familiarize students with basic biotechnological techniques, including synthesizing primary metabolites, immobilized cells and enzymes, aerobic and anaerobic processes, genetic transformation of plants, and analysis of transgenic plants. The possibilities of using biotechnology in the food industry, agriculture, environmental protection, and other branches of the economy and in basic research are presented. In self-conducted experiments, the student acquires the skills to work in a specialized biotechnology laboratory, recognizes the risks and rules of dealing with transgenic material and xenobiotic impurities, collects empirical data, and analyzes and interprets the results of the experiments.
List of modules that must be completed before starting this module (if necessary)	not applicable

8. Learning outcomes of the module

Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)
K01	Complies with the rules of work in a specialist laboratory.	1BT_K01	5
K02	The student applies the principles of bioethics and the principles of safe handling of transgenic material.	1BT_K04	4
U01	The student recognizes and applies the basic techniques used in a biotechnology laboratory focused on working with microbiological and plant material.	1BT_U03 1BT_U05	4 3
U02	The student can apply basic biotechnological methods for the acquisition, modification, and analysis of microbiological and plant material.	1BT_U02 1BT_U03	4 4
U03	The students can describe the effects of the experiment, analyze the results, draw conclusions, and present them as a report.	1BT_U03	4
W01	The student knows and can present the basic biotechnology methods of microorganisms and plants, including the		

	techniques of mutagenization and obtaining genetically modified microorganisms and plants.	1BT_W03 1BT_W05 1BT_W06 1BT_W09 1BT_W11 1BT_W13	4 3 4 4 4 4
W02	The student has basic knowledge of the possibility of using selected methods of biotechnology of microorganisms in the processes of synthesis of primary and secondary metabolites, remediation of degraded environments, and for replacing traditional technologies with environmentally friendly ones.	1BT_W06 1BT_W08 1BT_W11	4 4 4

9. Methods of conducting classes

Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture *a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided*
a05	Lecture methods / expository methods	Explanation/clarification *explication involving the derivation of a predetermined theorem from other, already known ones, in the number of steps specified by the person teaching the course*
b02	Problem-solving methods	Lecture-discussion *transmission of content involving interaction with the lecture audience; discussion of lecture-related issues is one of its elements or constitutes its follow-up*
c02	Demonstration methods	Video show *reproducing a film or video material in its entirety or in fragments in order to illustrate the content taught in class, to submit it to analysis and evaluation or to use it as an exercise in image perception; a film/video can be a work of art, an illustration (also technical illustration) of a content/phenomenon/object, a private record of an action, a media image, etc.*
c07	Demonstration methods	Screen presentation *a presentation of synthetic image content using computer graphics, e.g., a series of slides or other multimedia forms, usually accompanied by a commentary; typical components of a screen presentation include text organized into bulleted points, charts, images and animations, sometimes sound effects or music; a multimedia illustration of course content presented in the form of a projected image*
d02	Programmed learning methods	Working with a programmed textbook *working with a textbook containing instructional material covering part of or the entire curriculum of the module as well as a formula for studying the content; includes working with a subject textbook, an atlas, a catalogue, a problem book, etc.*
e01	Practical methods	Laboratory exercise / experiment *[also conducted as fieldwork] a method of practical application of knowledge; implemented in three stages: the recognition of a problem induced by the task content, the formulation of the problem and the attempt to solve it accompanied by the assessment of the effects; the goal is to acquire skills, abilities and habits, and to consolidate the acquired knowledge so that it becomes operational; the laboratory method assumes greater independence of learners than carrying out an experiment*
e02	Practical methods	Production exercise – workshop *an activity involving the creation of an object/product according to the rules/principles/description provided by the academic teacher acting as the workshop master*
f01	Methods of self-learning	Self-education

		a method which involves independent acquisition of knowledge, skills and social competences, extending their scope and quality; complementary to the learning process taking place in class; taking on the task of developing and adjusting qualifications on one's own; self-study
f02	Methods of self-learning	Individual work with a text *searching for and acquiring new information using textbooks and other written sources (including their digital versions); searching for texts, selecting fragments for analysis/interpretation, using other texts to solve a problem related to the studied issue*

10. Forms of teaching

Code	Name	Number of hours	Assessment of the learning outcomes of the module	Learning outcomes of the module	Methods of conducting classes
01	laboratory classes	55	course work	K01, K02, U01, U03, W01, W02	a05, c07, e01, e02, f01
02	lecture	30	exam	U02, W01, W02	a01, b02, c02, c07, d02, f01, f02

11. The student's work, apart from participation in classes, includes in particular:

Code	Category	Name (description)	Is it part of the BUNA?
a02	Preparation for classes	Literature reading / analysis of source materials *reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class*	No
a03	Preparation for classes	Developing practical skills *activities involving the repetition, refinement and consolidation of practical skills, including those developed during previous classes or new skills necessary for the implementation of subsequent elements of the curriculum (as preparation for class participation)*	Yes
a05	Preparation for classes	Production/preparation of tools, materials or documentation necessary for class participation *developing, preparing and assessing the usefulness of tools and materials (e.g. aids, scenarios, research tools, equipment, etc.) to be employed in class or as an aid when preparing for classes*	No
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content *reading through the syllabus and getting acquainted with its content*	Yes
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes *devising a task implementation strategy embracing the division of content, the range of activities, implementation time and/or the method(s) of obtaining the necessary materials and tools, etc.*	Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class *exploring the studied content, inquiring, considering, assimilating, interpreting it, or organizing knowledge obtained from the literature, documentation, instructions, scenarios, etc., used in class as well as from the notes or other materials/artifacts made in class*	No
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion *a set of activities aimed at performing an assigned task, to be executed out of class, as an obligatory phase/element of the verification of the learning outcomes assigned to the course*	No
d01	Consulting the results of the verification of learning outcomes	Analysis of the corrective feedback provided by the academic teacher on the results of the verification of learning outcomes *reading through the academic teacher's comments, assessments and opinions on the implementation*	Yes

		of the task aimed at checking the level of the achieved learning outcomes	

Information on the details of the module implementation in a given academic year can be found in the syllabus available in the USOS system: https://usosweb.us.edu.pl.