

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		Techniques for assessment of membrane permeability
Module code		1BT_23_62
Number of the ECTS credits		2
Language of instruction		
Purpose and description of the content of education		The module introduces the student to the structure and function of cell membranes, taking into account the role of cell membranes of organisms undergoing biotechnological modifications. The student acquires knowledge of membrane systems responsible for different types of transport. The module also enables the student to gain knowledge on the role of membrane transport in the proper functioning of plant cells, and to acquire the skills to carry out research related to the use of modern laboratory apparatus dedicated to membrane transport-related measurements, to analyse the results, obtained and to draw conclusions based on them.
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)
1BT_23_62_1	The student has knowledge of the structural organization of biological membranes, their physico-chemical properties and the role of cell membranes in the modification of organisms for biotechnology .	1BT_U07		2
		1BT_U11		3
		1BT_W01		3
		1BT_W02		3
		1BT_W03		3
		1BT_W09		2
1BT_23_62_2	List and describe the types of transport through membranes and the membrane systems involved.	1BT_U07		2
		1BT_W01		3
		1BT_W03		3
1BT_23_62_3	Conducts experiments using specialised laboratory equipment and analyses and interprets the results obtained and draws correct conclusions on the basis of the results.	1BT_U03		2
		1BT_U04		4
		1BT_W01		2
		1BT_W09		2

1BT_23_62_4	Can work individually and in a group respecting the rules of laboratory work.	1BT_K01	2
		1BT_U09	3
		1BT_W09	2
		1BT_W13	3

9. Methods of conducting classes		
Code	Category	Name (description)
a01	Lecture methods / expository methods	Formal lecture/ course-related lecture <i>a systematic course of study involving a synthetic presentation of an academic discipline; its implementation assumes a passive reception of the information provided</i>
b02	Problem-solving methods	Lecture-discussion <i>transmission of content involving interaction with the lecture audience; discussion of lecture-related issues is one of its elements or constitutes its follow-up</i>
d02	Programmed learning methods	Working with a programmed textbook <i>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.</i>
d03	Programmed learning methods	Working with another teaching tool <i>e.g. using websites in any way or according to the rules set by the teacher; or making use of other subject-specific tools</i>
e01	Practical methods	Laboratory exercise / experiment <i>[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</i>
e06	Practical methods	Observation <i>also conducted as fieldwork; a method of watching phenomena, objects or people in a systematic/planned way in order to gain knowledge about them; perceptual separation of elements of a model action as an element of learning through imitation; a complex system of cognition based on sensory experiences</i>
f01	Methods of self-learning	Self-education <i>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</i>
f02	Methods of self-learning	Individual work with a text <i>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</i>

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
1BT_23_62_fs1	lecture	4	course work	1BT_23_62_1, 1BT_23_62_2, 1BT_23_62_3, 1BT_23_62_4	a01, b02, d02, f01, f02
1BT_23_62_fs2	laboratory classes	26	course work	1BT_23_62_1, 1BT_23_62_2, 1BT_23_62_3, 1BT_23_62_4	d02, d03, e01, e06, 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?
a01	Preparation for classes	Search for materials and review activities necessary for class participation <i>reviewing literature, documentation, tools and materials as well as the specifics of the syllabus and the range of activities indicated in it as required for full participation in classes</i>	Yes
a02	Preparation for classes	Literature reading / analysis of source materials <i>reading the literature indicated in the syllabus; reviewing, organizing, analyzing and selecting source materials to be used in class</i>	Yes
b01	Consulting the curriculum and the organization of classes	Getting acquainted with the syllabus content <i>reading through the syllabus and getting acquainted with its content</i>	Yes
c02	Preparation for verification of learning outcomes	Studying the literature used in and the materials produced in class <i>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</i>	Yes
c03	Preparation for verification of learning outcomes	Implementation of an individual or group assignment necessary for course/phase/ examination completion <i>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</i>	Yes

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>.