

1.	Field of study	Biotechnology
2.	Faculty	Faculty of Natural Sciences
3.	Academic year of entry	2023/2024 (winter term), 2024/2025 (winter term)
4.	Level of qualifications/degree	first-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

<b>7. General information about the module</b>	
Module name	Genetic engineering
Module code	1BT_23_24
Number of the ECTS credits	5
Language of instruction	
Purpose and description of the content of education	The module aims to provide advanced, detailed knowledge of selected genetic engineering procedures and present their applications in biochemical, microbiological and molecular genetics research, as well as in industry and medicine. It provides advanced knowledge of enzymes used in genetic engineering, methods of creating constructs, vectors used in cloning, the procedure of cloning DNA fragments, and familiarizes with the techniques of labelling nucleic acids and the use of labelled probes in nucleic acid hybridization procedures. During laboratory classes, in groups of several people, the student will acquire the ability to perform all stages of the procedure of cloning a DNA fragment and detecting the insert in host cells and acquire the skills of analysis, interpretation and discussion of the obtained results.
List of modules that must be completed before starting this module (if necessary)	not applicable

<b>8. Learning outcomes of the module</b>			
Code	Description	Learning outcomes of the programme	Level of competenc (scale 1-5)
1BT_23_24_1	has advanced, detailed knowledge of nucleic acid testing methods and genetic material manipulation procedures, understands the use of specific tools and techniques in the field of genetic engineering to solve research problems in the field of molecular biology and presents the possibilities of their use in biotechnology, industry and medicine, and also recognizes the need for updating knowledge in the field of genetic engineering based on available sources of scientific information and for its dissemination	1BT_K03 1BT_K05 1BT_U11 1BT_W05 1BT_W06 1BT_W09	5 5 3 5 5 5
1BT_23_24_2	knows and understands the principles of planning typical experiments in the field of genetic engineering, the role and purposefulness of the use of individual reagents and molecular tools, and understands the use of specialized laboratory equipment in the manipulation of genetic material	1BT_W05 1BT_W06 1BT_W09	5 5 5
1BT_23_24_3	designs and, under the supervision of the teacher, conducts experiments in small groups that require the use of tools and techniques in the field of genetic engineering, describes their effects, analyzes and discusses the results, and formulates conclusions and presents them in the form of a report.	1BT_U03 1BT_U04 1BT_U05	3 5 5

		1BT_U09	5
1BT_23_24_4	knows and observes the rules of occupational health and safety while performing laboratory procedures in the field of genetic engineering and demonstrates responsibility for the laboratory equipment used during independent work	1BT_U09 1BT_W13	5 5

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>	
b08	Problem-solving methods	Activating method – peer learning <i>learning through the exchange of knowledge in a group/team/pair of students, i.e., in the so-called learning cell; a kind of mutual learning; an approach focused on student activity under the guidance of the person teaching the course; a learning situation where students with a similar level of experience learn from one another</i>	
b09	Problem-solving methods	Activating method – flipped classroom <i>anticipatory learning; work in class is based on previously studied material indicated by the person teaching the course; preparation outside the classroom serves the purpose of getting familiar with the issues whose knowledge is necessary for participating in the in-class discussion and the training in the related practical skills; the activity is based on the work of students under the guidance of the person teaching the course</i>	
c06	Demonstration methods	Demonstration-imitation <i>a presentation of a model way of performing specific activities accompanied by a commentary; it aims at triggering imitation activities in an individual or in a group of participants observing the activities of the person teaching the course until the right habit is formed through regular exercise; the demonstration-imitation method is combined with a physical practice of activities/behaviours</i>	
c07	Demonstration methods	Screen presentation <i>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</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>	
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</i>	

		<i>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_24_fs_1	lecture	15	course work	1BT_23_24_1	a01, b02, d02, f01, f02
1BT_23_24_fs_2	laboratory classes	60	course work	1BT_23_24_2, 1BT_23_24_3, 1BT_23_24_4	b02, b08, b09, c06, c07, d02, d03, e01, 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>	No
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>	No
a04	Preparation for classes	Consulting materials complementary to those indicated in the syllabus <i>agreeing on materials complementary to those indicated in the syllabus, supporting the implementation of tasks resulting from or necessary for class participation</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
b02	Consulting the curriculum and the organization of classes	Verification / adjustment / discussion of syllabus provisions <i>consulting the content of the syllabus, possibly in the presence of the year tutor or members of the class group, and, if necessary, reassessing the provisions concerning special conditions for class participation, e.g., space and time requirements, technical and other requirements, including conditions for participation in classes outside the walls of the university, classes organized in blocks, organized online, etc.</i>	Yes
b03	Consulting the curriculum and the organization of classes	Consulting the schedule <i>getting acquainted with the class schedule, possibly in the presence of the year tutor, in order to optimize participation in classes, including those supplementary to the core subjects listed in the pursued study programme</i>	Yes
c01	Preparation for verification of learning outcomes	Determining the stages of task implementation contributing to the verification of learning outcomes <i>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.</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</i>	No

		<i>well as from the notes or other materials/artifacts made in class</i>	
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
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 <i>reading through the academic teacher's comments, assessments and opinions on the implementation of the task aimed at checking the level of the achieved learning outcomes</i>	Yes
d02	Consulting the results of the verification of learning outcomes	Development of a corrective action plan as well as supplementary/corrective tasks <i>reviewing and selecting tasks and activities enabling the elimination of errors indicated by the academic teacher, their verification or correction resulting in completing the task with at least the minimum passing grade</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>.