

1.	Field of study	Biology
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

7.	General information about the module	
Module name		Cytogenetics
Module code		1BL_23_36
Number of the ECTS credits		3
Language of instruction		
Purpose and description of the content of education		<p>The subject provides basic knowledge in the field of cytogenetics. Students are acquainted with topics related to the organisation and evolution of genomes and karyotypes. Particular attention is paid to the structure and evolution of chromosomes and the methods of chromosome analyses. During the course, the student is acquainted with the practical use of cytogenetic methods in experimental biology and biotechnology. The student also has the opportunity to learn how to interpret the results of the newest publication on genome evolution.</p> <p>The course aims to acquaint students with (1) basic knowledge of methods used in cytogenetics, such as preparation of cytogenetic slides, performing basic chromosome staining and banding methods, as well as preparing karyograms and idiograms; (2) knowledge about the genome size and endopolyploidization during plant development, structure and (3) types of chromosomes and their behaviour during cell division (e.g. reverse meiosis, nondisjunction); (4) mechanisms responsible for karyotype evolution. Students can plan and conduct simple experiments, observations and analyses, as well as draw conclusions and prepare scientific documentation. Students will be able to discuss scientific topics related to genome evolution and the application of cytogenetic techniques in agriculture (e.g., addition lines, translocation, etc., interspecies hybrids).</p>
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)	
01	Students can explain the basic scientific terminology in the field of cytogenetics used in scientific publication	1BL_W02	5	
		1BL_W05	5	
02	Students have knowledge of the structure and evolution of chromosomes	1BL_W05	5	
		1BL_W06	3	
03	Students know the basic cytogenetic techniques and can apply them to analyse the structure and evolution of chromosomes.	1BL_U01	5	
		1BL_U11	5	
		1BL_W08	5	
04	Students can explain the scientific bases of cytogenetic methods	1BL_U01	5	

		1BL_U10 1BL_W08	3 5
05	Students can apply basic techniques of chromosome preparation and staining to solve cytogenetic research problems	1BL_U01 1BL_U06 1BL_U09	5 5 4
06	Students can plan and perform cytogenetic experiments and then correctly interpret obtained results based on scientific literature	1BL_K01 1BL_U03 1BL_U04 1BL_U06 1BL_U07 1BL_U08 1BL_U09 1BL_U14	3 5 5 5 5 4 4 1
07	Students are responsible for their own work and the microscope and laboratory equipment they work with	1BL_W12	5
08	Students are aware that they have to constantly improve their knowledge and critical approach to available sources of information	1BL_K01 1BL_K04 1BL_K05 1BL_U15	3 5 5 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>
a03	Lecture methods / expository methods	Description <i>a description of objects, phenomena, processes or people; it involves specifying the structure and characteristic features of the object, phenomenon, or process being described; it is usually accompanied by a demonstration of the described object or by its models, drawings, tables, charts, etc.; a description may take the form of an explanation, classification, justification or comparison</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>
b04	Problem-solving methods	Activating method – discussion / debate <i>an exchange of views supported by substantive arguments leading to a clash of different views, a compromise or the identification of common positions; it proceeds according to previously agreed-upon rules regarding the time, manner and turn-taking as well as the principles of civil discourse; a discussion is not a competition but aims at finding the best solutions or presenting different points of view; its varieties include brainstorming, Oxford-style debate, panel discussion, decision tree, conference discussion; a debate is an orderly dispute between supporters and opponents of a viewpoint, usually specialists in the field or pre-selected representatives of a group dealing with a common problem</i>

b05	Problem-solving methods	Activating method – seminar / proseminar <i>a seminar method; usually an oral presentation of a previously studied/diagnosed problem delivered on a forum; it aims at provoking a discussion concerning the results of research work; a type of conference, course or training session modelled on seminar classes</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>
c02	Demonstration methods	Video show <i>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.</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>
d01	Programmed learning methods	Working with a computer <i>e.g., Webquest; implementation of educational tasks using electronic and digital devices, computer programs and Internet applications; the academic teacher acts as a consultant; students' work is carried out step by step according to the plan laid own by the person teaching the course and following his instructions, and proceeds towards producing the indicated results within the set deadline</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 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
03	laboratory classes	35	course work	01, 02, 03, 04, 05, 06, 07, 08	a03, b08, c06, c07, d01, e01,

					f01, f02
W01	lecture	7	course work	01, 02, 03, 04	a01, c02, c07
W02	discussion classes	8	course work	01, 02, 03, 04, 05, 08	b02, b04, b05, c02, c07, 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
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
d03	Consulting the results of the verification of learning outcomes	Review of internship documentation <i>an analysis of the portfolio of documentation obtained during internship, including professional internship, and other practical classes and studio sessions, as well as the documentation developed in order to obtain credit for such classes; verification of the description, necessary attachments, opinions and grades before submitting the portfolio for acceptance</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>.