University of Gdańsk

Subject card

Subject name and code	Biotechnology of plants and algae, PG_00198345		
Field of study	Genetics and Experimental Biology		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2027/2028
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study
Mode of study	full-time studies	Mode of delivery	at the university
Year of study	2	Language of instruction	Polish
Semester of study	4	ECTS credits	2.0
Learning profile	academic	Assessment form	credit
Conducting unit	Department of Experimental Biology and Plant Biotechnology -> Faculty of Biology -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Joanna Rojek	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	0.0	30.0	0.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	2.0	18.0	50

Subject objectives

Understand the applicability of biotechnology techniques in experimental plant biology: creation of new species, GMOs in plant reproduction research, use of biotechnology in agriculture, horticulture, medicine

Learning outcomes

Course outcome	Subject outcome	Method of verification
[GBEL3_W05] A graduate has an advanced knowledge and understanding of: principles for planning research based on the achievements of biological sciences and related disciplines and the possibility of putting their results into practice, principles for the operation of equipment and apparatus used in molecular genetics research, and the principle of interpreting biological phenomena and processes based on empirical data in research work and practical action, taking into account the sustainable use of biodiversity.	The graduate will be familiar with the principles of research planning based on the achievements of the biological sciences and the possibilities of using their results in practice, the principles of operation equipment and apparatus used in plant and algal biotechnology research and the principle of interpretation of biological phenomena and processes based on empirical data in research work and practical action, taking into account the sustainable use of biodiversity	[SW1] oral statement/ conversation/discussion [SW2] presentation/project/paper/ report
[GBEL3_K01] The graduate is prepared to: use of theoretical knowledge in laboratory and production practice	The graduate is ready to apply theoretical knowledge in laboratory and production practice	[SK1] oral statement/conversation/ discussion

Subject contents	Legal aspects of working with GMOs, description and identification of gene donor and recipient organisms. Tools bioinformatics in plant and algal biotechnology. Differences between plant and other expression systems, adaptation of nonplant to expression in plant cells. Methods of production and extraction of plant secondary metabolites. Application of biotechnological techniques in experimental plant biology and agriculture.
Prerequisites and co-requisites	lack

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
completion of a credit work - project or presentation	51.0%	50.0%
determination of a pass mark on the basis of partial marks received during the semester	51.0%	50.0%

Recommended reading

Basic literature	Malepszy S. (red.). 2009. Biotechnologia Roślin, PWN, Warszawa. Michalik B. (red.). 2009. Hodowla roślin z elementami genetyki i biotechnologii. PWRiL Naukowe publikacje przeglądowe z zakresu biologii eksperymentalnej i biotechnologii roślin.
Supplementary literature	Cole C. [Ed]. 2014-2020. Compendium of Plant Genomes. Springer Loyola-Vargas V.M., Vázquez-Flota F. (red.). 2006. Plant Culture Protocols. W: Methods in molecular Biology. Humana Press, Totowa, New Jersey. Pokora, W., Aksmann, A., Baścik-Remisiewicz, A., Dettlaff-Pokora, A., Rykaczewski, M., Gappa, M., Tukaj, Z. Changes in nitric oxide/hydrogen peroxide content and cell cycle progression: Study with synchronized cultures of green alga Chlamydomonas reinhardtii. Journal of Plant Physiology (2017) 208, 8493. Rojek J, Tucker MR, Rychłowski M, Nowakowska J, Gutkowska M. 2021. The Rab Geranylgeranyl Transferase Beta Subunit Is Essential for Embryo and Seed Development in Arabidopsis thaliana. International Journal of Molecular Sciences. 22(15):7907. https://doi.org/10.3390/ijms22157907 Rojek J, Tucker MR, Pinto SC, Rychłowski M, Lichocka M, Soukupova H, Nowakowska J, Bohdanowicz J, Surmacz G, Gutkowska M. 2021. Rab dependent vesicular traffic affects female gametophyte development in Arabidopsis. Journal of Experimental Botany. 72(2): 320-340. doi: 10.1093/jxb/eraa430 Chincinska I.A., Kapusta M., Zielińska E., Miklaszewska M., Błażejewska K., Tukaj Z. Production of recombinant human deoxyribonuclease I in Lua cylindrica L. and Nicotiana tabacum L.: evidence for protein secretion to the leaf intercellular space. Plant Cell, Tissue and Organ Culture (2019) 136 (1), 5163. Miklaszewska M., Banaś A., Królicka A. Metabolic engineering of fatty alcohol production in transgenic hairy roots of Crambe abyssinica. Biotechnology and Bioengineering (2017) 114(6), 1275-1282. Chincinska, Izabela Anna. "Leaf infiltration in plant science: old method, new possibilities." Plant Methods 17.1 (2021): 1-21.
eResources addresses	

Example issues/ example questions/ tasks being completed	**Task SSR** 1. Find in the publication (Li et al., 2017) information on how the microsatellite database developed for the genus *Boechera* (BMW) can be used to estimate the origin of a studied population (accession), its ploidy level, and its mode of reproduction. 2. After reading the publication, consider whether you understand the purpose of the TESLA and PRIUS algorithms. 3. Read the instructions for searching the *Boechera* microsatellite database (BMW) (file titled *A Quick Guide on Boechera Microsatellite Website Tutorial*). 4. Visit the BMW website to test the database instructions: http://sites.biology.duke.edu/windhamlab/ **Task for volunteers (before/after class):** • Correct completion of the table: **2 points for participation** • During lab sessions, you can earn a maximum of **3 points** (another task will be assigned); this corresponds to **+0.5 added to the final grade** 1. Access the BMW website: http://sites.biology.duke.edu/windhamlab/ 2. Using data on allele size and locus polymorphism for two unknown genotypes (accessions), identify the missing data (cells highlighted in yellow/red; the table with SSR data for two unknown genotypes is provided in the attachment). 3. Complete the table with the missing data and submit the file with your answers to the assignment folder. **Notes on the database:** • The BMW database does not function perfectly in all web browsers. Issues may occur with downloading the data input template (the Batch tab) and generating reports. The report is **not required** for this task. • If you want to upload data using the template (BATCH), a template file is provided with the assignment. • After removing the example data from the template, follow the instructions and **do not add or delete any rows or columns**. **To prepare the file for analysis:** • After entering the appropriate values, save the file under a different name with the extension: **Text (Tab-delimited)**
Work placement	Not applicable

Document generated electronically. Does not require a seal or signature.