University of Gdańsk

Subject card

Subject name and code	Development and differentiation of the cells and organisms, PG_00154731		
Field of study	Biology		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2024/2025
Education level	postgraduate studies	Subject group	Obligatory subject group in the field of study Optional subject group 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	2.0
Learning profile	academic	Assessment form	
Conducting unit			
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	30.0	0.0	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	4.0	16.0	50

Subject objectives	
	- Gain knowledge of the molecular and cellular mechanisms of reproduction and development of plant organisms,- Knowledge of the processes leading to the proper development and differentiation of plant and animal cells and tissues,- The ability to correlate knowledge of the regulation of developmental processes at the molecular [(epi-) genetic] and cellular levels.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOLMU2_W04] the graduate has an in-depth knowledge of the chosen specialisation in the biological sciences	The graduate has an in-depth knowledge of the development and differentiation of cells and plant and animal organisms B2_W04	[SW4] test/exam - oral or written
[BIOLMU2_K05] the graduate is prepared to use recognised sources of scientific and popular information in the biological sciences to further his or her knowledge	The graduate understands the need to use recognized sources of scientific and popular science in the field of biological sciences in order to advance knowledge B2_K05	[SK4] test/exam - oral or written
[BIOLMU2_U07] the graduate is able to critically confront biological information from a variety of sources and, on this basis, draw valid conclusions	The graduate critically confronts biological information from different sources and on this basis draws justified conclusions B2_U07	[SU4] test/exam - oral or written
[BIOLMU2_W01] the graduate knows and understands natural phenomena and processes at different levels of complexity	The graduate understands the phenomena and processes of development and differentiation of cells and organisms at different levels of complexity B2_W01	[SW4] test/exam - oral or written
[BIOLMU2_U02] the graduate is able to make proficient use of the scientific literature of the biological speciality studied	The graduate is proficient in the use of scientific literature on the development and differentiation of cells and organisms B2_U0	[SU4] test/exam - oral or written

Subject contents

Plant part:Molecular and cellular mechanisms of formation and differentiation of main meristems, lateral meristems and plant tissues.Molecular mechanisms of formation and differentiation of gametophytes, gametes, zygote.Genetic regulation of embryogenesis and seed development.The use of mutants and transgenic plants to explain the regulation of processes in plant development.Animal part:Basic mechanisms of reproduction of animal organisms.Molecular and cellular mechanisms of oogenesis; spermatogenesis and the process of fertilization;Genetic regulation of early embryonic development of Drosophila melanogaster; homeotic genes, homeoboxes and homeodomains; geneticregulation of Caenorhabditis elegans development; regulation of the formation of various tissues and organs; development of the vertebrate nervous system; geneticbasis of tumorigenesis and developmental disorders.Selected examples of induction of animal cell differentiation in vitro, molecular markers of tissues and cell lines.

Prerequisites and co-requisites

Passing the compulsory subjects of the bachelor's degree

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Class participation, written test	51.0%	100.0%

Recommended reading

Basic literature	The lecture is an original study of the issues of molecular biology of development and differentiation of plant and animal cells based onmany years of study of source literature and own research.Recommended literature:Literature - primarily in the form of published review and experimental papers - will be suggested on an ongoing basis.- Scott F. Gilbert 2014, Developmental Biology, 10th Edition, Sinauer Associates , Inc., Sunderland, MA- Lodish H., Berk A, Kaiser C., Krieger M., Scott M, Bretscher A, 2007. Molecular Cell Biology. Scientific American Books, Washington, DC.- Krzanowska H, Sokół-Misiak W, 2002, Molekularne mechanizmy rozwoju zarodkowego. Wydawnictwo Naukowe PWN, Warszawa- Bielańska-Osuchowska Z, 2004, Zarys organogenezy. Wydawnictwo Naukowe PWN, Warszawa
Supplementary literature	Rojek J, Tucker MR, Rychłowski M, Nowakowska J, Gutkowska M. 2021. The Rab Geranylgeranyl Transferase Beta Subunit Is Essential for Embryoand Seed Development in Arabidopsis thaliana. International Journal of Molecular Sciences. 22(15):7907. https://doi.org/10.3390/ijms22157907Rojek J, Tucker MR, Pinto SC, Rychłowski M, Lichocka M, Soukupova H, Nowakowska J, Bohdanowicz J, Surmacz G, Gutkowska M. 2021. Rabdependentvesicular traffic affects female gametophyte development in Arabidopsis. Journal of Experimental Botany. 72(2):320-340. doi:10.1093/jxb/eraa430Rajewsky N, Jurga S, Barciszewski J . 2017. Plant Epigenetics. Springer
eResources addresses	Adresy na platformie eNauczanie:

Example issues/ example questions/ tasks being completed

The written test covers the lecture material in the form of closed questions.

Work placement	Not applicable

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