University of Gdańsk

Subject card

Subject name and code	Development and differentiation of cells and organisms, PG_00147827						
Field of study	Genetics and Experimental Biology						
Date of commencement of studies	October 2026		Academic year of realisation of subject		2028/2029		
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	3		Language of instruction		Polish		
Semester of study	6		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
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
[GBEL3_W06] A graduate has an advanced knowledge and understanding of: the development and current state of knowledge and the latest trends in molecular genetics and related fields; indicates their relationship to other disciplines in the life sciences or medical sciences and their potential for use in practice	The graduate is oriented in the development and current state of knowledge concerning the development and differentiation of of cells and organisms and the latest trends in molecular genetics; indicates their relationship with other disciplines of natural or medical sciences and the possibilities of their use in practice (GM1_W06	[SW4] test/exam - oral or written
[GBEL3_U04] The graduate is able to: read scientific texts in English and Polish with comprehension, synthesise the knowledge they contain, prepare well-documented papers on biological problems and on the commercialisation of research.	Graduates are able to read with understanding scientific texts in English and Polish in the field of in the field of developmental biology, synthesizes the knowledge contained therein, prepares well-documented elaborations of biological problems, in particular concerning the development and differentiation of plant and animal cells and organisms. (GM1_U04)	[SU4] test/exam - oral or written
[GBEL3_K07] The graduate is prepared to: lifelong learning and updating of knowledge in molecular genetics and other fields.	The graduate understands the need for lifelong learning and updating knowledge of developmental biology of organisms (GM1_K07).	[SK4] test/exam - oral or written

Subject contents

Plant part:Molecular and cellular mechanisms of formation and differentiation of embryonic, main and lateral meristems and plant tissues.Molecular and cellular mechanisms of gametophyte, gamete, embryo and endosperm formation and differentiation.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

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Attendance at lectures, written test with closed questions	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/eraa430Paro R, Grossniklaus U, Santoro R, Wutz A. 2021. Introduction to epigenetics. Learning materials in biosciences. Cham, Switzerland: Springer, 179201.Rajewsky N, Jurga S, Barciszewski J . 2017. Plant Epigenetics. Springer

	eResources addresses	
Example issues/ example questions/ tasks being completed	The written test covers the material from the lecture in the form of closed questions	
Work placement	Not applicable	

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