University of Gdańsk

Subject card

Subject name and code	Functioning of organisms at the molecular level, PG_00196849						
Field of study	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 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	3		Language of instruction		Polish		
Semester of study	5		ECTS credits		1.0		
Learning profile	academic		Assessment form		credit		
Conducting unit							
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Anna Herman-Antosiewicz				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	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	15		2.0		8.0	25
Subject objectives	Knowledge and understanding of processes related to the variability of genetic material and its consequences. Ability to select methods and techniques for examining the impact of genetic and epigenetic changes on cell biology and interpreting the results. Ability to give oral presentations and independently search for information.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOLL3_U10] The graduate is able to prepare oral presentations in Polish and a foreign language on specific topics in the field of biology	has the ability to give oral presentations in Polish on specific issues related to the molecular basis of the functioning of organisms - applies to tutorial	[SU1] oral statement/conversation/ discussion [SU2] presentation/project/paper/ report
[BIOLL3_U05] The graduate is able to synthesise data from a variety of sources and draw appropriate conclusions	synthesizes data from various sources and draws appropriate conclusions on this basis, which is used in the preparation of presentations - applies to tutorial	[SU2] presentation/project/paper/ report
[BIOLL3_K03] The graduate is able to organise the work of a small team and work effectively as part of a team	can organize the work of a small team and demonstrates the ability to work effectively in a team - applies to tutorial	[SK2] presentation/project/paper/ report
[BIOLL3_W14] The graduate has an advanced understanding of experimental methods and the most important techniques used in the biological sciences	explains the theoretical basis of experimental methods, lists the most important techniques for examining the genetic material and the response of cells to its changes	[SW4] test/exam - oral or written [SW2] presentation/project/paper/ report
[BIOLL3_W16] The graduate knows and understands the relationship between the achievements of a chosen field of science and discipline of natural sciences, and the possibilities of their use in socio-economic life, taking into account the sustainable use of biodiversity	explains the connections between the achievements of molecular biology and the possibilities of its use in socio-economic life	[SW2] presentation/project/paper/ report
[BIOLL3_W02] The graduate knows and uderstands at an advanced level the structure and properties of biological macromolecules, molecular mechanisms of basal metabolic pathways and the flow of genetic information, as well as the sources of variation in organisms; the rules of inheritance	knows the molecular mechanisms of variability of genetic information and its impact on the functioning of cells and entire organisms	[SW2] presentation/project/paper/ report [SW3] text preparation/written work
[BIOLL3_U06] The graduate can read with comprehension scientific biological texts in Polish and simple texts in English	reads and understands scientific texts in Polish and simple texts in English	[SU2] presentation/project/paper/ report

Subject contents

Control of the frequency of initiation of replication and transfer of DNA to daughter cells in connection with the cell cycle in eukaryotic cells. Transmission of DNA damage signals in eukaryotic cells. Chromatin structure and gene expression. Variability of genetic material: mutagenesis and DNA repair processes, mobile genetic elements, genome rearrangements. Molecular basis of cancer

Prerequisites and co-requisites

Basic knowledge of the biology of nucleic acids and eukaryotic cells, understanding the relationship between genotype and phenotype

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
test covering material from lectures	51.0%	100.0%

Recommended reading

Basic literature

Lewin B. Genes VIII. Oxford University Press, USA, 2004

Lodish H. i wsp. Molecular Cell Biology. W.H.Freeman &Co., 2016, New York

Węgleński P. Genetyka molekularna, PWN, Warszawa, 2008

Alberts i wsp. Podstawy biologii komórki, PWN, Warszawa, 2009-2016

	Supplementary literature	Materials indicated by the lecturer, including: Herman-Antosiewicz A, Stan SD, Hahm ER, Xiao D, Singh SV. (2007) Activation of a novel ataxia-telangiectasia mutated and Rad3 related/ checkpoint kinase 1-dependent prometaphase checkpoint in cancer cells by diallyl trisulfide, a promising cancer chemopreventive constituent of processed garlic. Mol Cancer Ther. 6:1249-61. Herman-Antosiewicz A, Kim Y-A, Kim S-H, Xiao D, Singh SV. (2010) Diallyl trisulfide-induced G2/M chase cell cycle arrest In DU145 cells is associated with delayed nuclear translocation of cyclin-dependent kinase 1. Pharm. Res. 27: 1072-1079. Hać A., Brokowska J., Rintz E., Bartkowski M., Węgrzyn G., Herman-Antosiewicz A. (2019) Mechanism of selective anticancer activity of isothiocyanates relies on differences in DNA damage repair between cancer and healthy cells. Eur J Nutr. 59(4):1421-1432 Zdrowowicz M, Spisz P, Hać A, Herman-Antosiewicz A, Rak J. (2022) Influence of Hypoxia on Radiosensitization of Cancer Cells by 5-Bromo-2'- deoxyuridine. Int J Mol Sci. 2022 Jan 27;23(3):1429
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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