University of Gdańsk

Subject card

Subject name and code	Molecular biology of Eukaryota, PG_00148794						
Field of study	Medical Biology						
Date of commencement of studies	October 2024		Academic year of realisation of subject	2025/2026			
Education level	undergraduate studies		Subject group	Obligatory subject group 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				
Conducting unit	Katedra Biologii i Genetyki Medycznej -> Faculty of Biology						
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	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	1. Understanding the synthesis of proteins and the regulation of this process in eukaryotic cells2. Familiarization with the main mechanisms of intracellular protein transport3. Learning and understanding the processes related to the variability of genetic material and its consequences4. Familiarization with the most important signaling pathways for DNA damage or stopping DNA replication5. Acquiring the ability to use laboratory methods and techniques for studying the biology of eukaryotic cells						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOLMEDL3_W06] describes, explains and compares systemic control mechanisms in animal and human organisms (including onto- and phylogenetic points of view) and the neurobiological and genetic basis of different disorders	describes the molecular mechanisms of expression and variability of genetic information and the importance of these processes in the functioning of cells and entire organisms	[SW4] test/exam - oral or written
[BIOLMEDL3_W16] explains the theoretical basis of experimental methods and lists the most important techniques of biological sciences that can be applied to medical biology and diagnostics	has knowledge of the most important techniques for material testing genetic - its expression, variability and cell response to disorders these processes, which may have applications in medical biology and diagnostics	[SW4] test/exam - oral or written
[BIOLMEDL3_U01] uses basic apparatus and research tools and, maintaining the correct sequence of operations, performs simple physical, biological or chemical observations and measurements in laboratory work in the biological or medical sciences	189 / 5 000 uses basic equipment and research tools in cell manipulation and, maintaining the correct sequence of activities, performs simple experiments with the use of eukaryotic cells - applies to exercises	[SU2] presentation/project/paper/ report [SU8] observation of student's independent or team work
[BIOLMEDL3_K07] Is responsible for the equipment/materials entrusted to him and his own work and respects the work of others	uses basic equipment and research tools in cell manipulation and, maintaining the correct sequence of activities, performs simple experiments with the use of eukaryotic cells - applies to exercises	[SK2] presentation/project/paper/ report [SK8] observation of student's independent or team work
[BIOLMEDL3_K01] understands the need for lifelong learning and to update his/her knowledge of medical biology and related disciplines	understands the need for lifelong learning and updating knowledge regarding molecular basis of the functioning of eukaryotic cells and having application in medical biology	[SK8] observation of student's independent or team work
[BIOLMEDL3_W12] is oriented in the development and current state of knowledge and the latest trends in medical biology; indicates their relationship with other disciplines of natural or medical sciences	is familiar with the current state of knowledge and the latest trends in molecular biology of eukariotic cells and indicates their relationship with other scientific disciplines natural or medical sciences, especially in the field of medical biology	[SW4] test/exam - oral or written

Subject contents

Topics of the lecture:

Structure of mRNA and tRNA molecules. The structure and principles of instability of the genetic code. Mechanism of action of aminoacyl-tRNA synthetases. A detailed discussion of the course and mechanisms of regulation of the initiation, elongation and termination of the translation process in eukaryotic cells. Regulation of gene expression at the level of the translation process. General mechanisms of intracellular protein transport, the role of protein signal sequences, the structure of translocons. Protein folding in the endoplasmic reticulum. Discussion of the mechanisms of transmembrane and vesicular transport. Control of the frequency of initiation of replication and transfer of DNA to daughter cells in connection with the division cycle of eukaryotic cells. Cell aging, the role of telomeres. Transmission of DNA damage signals in eukaryotic cells. Chromatin structure and gene expression. Epigenetic changes and their impact on the functions of cells and the human body. 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 cell biology, molecular biology, biochemistry, genetics

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written test exam with a pool of open questions	51.0%	100.0%

Recommended reading

Basic literature	1. Molecular Cell Biology, Lodish H., Berk A., Zipursky S.L., Matsudaira P., Baltimore D., Darnell J.E.; W.H. Freeman and Company, 2016 (wcześniejsze wydania są dostępne online) 2. Molecular Biology of the Cell, Alberts B., Johnson A., Lewis J., Raff M., Roberts K., Walter P.; 2014 (wcześniejsze wydania są dostępne online) 3. Genes VIII, Lewin B., Benjamin Cummings, 2004 4. Biochemia, Berg J.M., Stryer L., Tymoczko J.L., wydanie polskie, PWN, 2007

	Supplementary literature	materials indicated by the lecturer, e.g. 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 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. 6:1249-61 Herman-Antosiewicz A, Lew KL, Xiao H, Singh SV. (2007) Induction of p21 protein protects against sulforaphane-induced mitotic arrest in LNCaP human prostate cancer cell line. Mol Cancer Ther. 6: 1673-81. 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 Slominska-Wojewodzka M, Gregers TF, Walchli S, Sandvig, K. (2006) EDEM Is Involved in Retrotranslocation of Ricin From the Endoplasmic Reticulum to the Cytosol. Mol Biol Cell, 17: 1664-75. Slominska-Wojewodzka M, Sandvig, K. (2015) The Role of Lectin-Carbohydrate Interactions in the Regulation of ER-Associated Protein Degradation. Molecules, 20: 9816-46. Nowakowska-Gołacka J, Sominka H, Sowa-Rogozińska N, Słomińska-Wojewódzka M. (2019) Toxins Utilize the Endoplasmic Reticulum-Associated Protein Degradation Pathway in Their Intoxication Process. Int J Mol Sci, 20 (6).
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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