

**Subject card**

<b>Subject name and code</b>	Biochemical basis of gene expression, PG_00048681						
<b>Field of study</b>	Biochemiczne podstawy ekspresji genów (Wykład)						
<b>Date of commencement of studies</b>	October 2022	<b>Academic year of realisation of subject</b>			2024/2025		
<b>Education level</b>	Bachelor's studies	<b>Subject group</b>					
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	3	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	5	<b>ECTS credits</b>			1.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Laboratory of Intracellular Signalling -> Department of Medical Biology and Genetics -> Faculty of Biology -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	<b>Subject supervisor</b>		dr hab. Monika Słomińska-Wojewódzka				
	<b>Teachers</b>		dr hab. Monika Słomińska-Wojewódzka				
<b>Lesson types</b>	<b>Lesson type</b>	Lecture	Tutorial	Laboratory	Project	Seminar	<b>SUM</b>
	<b>Number of study hours</b>	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	<b>Learning activity</b>	Participation in didactic classes included in study plan		Participation in consultation hours		Self-study	<b>SUM</b>
	<b>Number of study hours</b>	15		0.0		0.0	15
<b>Subject objectives</b>	<ol style="list-style-type: none"> <li>1. Familiarization with the structure of mRNA and tRNA molecules, as well as the function of aminoacyl-tRNA synthetases and ribosomes.</li> <li>2. To learn in detail the mechanisms of protein synthesis in prokaryotic and eukaryotic cells, and to discuss how this process is regulated at different stages.</li> <li>3. To learn about the general issues of protein folding and degradation.</li> <li>4. To be able to use available sources of biological information in preparing scientific presentations.</li> </ol>						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[BIOLL3_W11] the graduate knows and understands the basic methods of statistical analysis and their importance in the interpretation of phenomena and processes	nie dotyczy	[SW4] test/egzamin - ustny lub pisemny
	[BIOLL3_W10] the graduate knows and understands to an advanced degree the development and current state of knowledge and the latest trends in biology, as well as their relationship with other natural disciplines	Explains the theoretical basis of experimental methods and the most important techniques used in the study of the various stages of the translation process.	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/diskusja
	[BIOLL3_U10] the graduate is able to prepare oral speeches in Polish and foreign language concerning specific issues in biology	nie dotyczy	[SU1] wypowiedź ustna/rozmowa/diskusja
	[BIOLL3_U08] the graduate is able to learn independently, in a focused manner	He learns independently in a focused manner.	[SU1] wypowiedź ustna/rozmowa/diskusja [SU4] test/egzamin - ustny lub pisemny
	[BIOLL3_U07] the graduate is able to independently search and use available sources of biological information, including electronic sources	Independently searches for and uses available sources of biological information, including electronic sources.	[SU1] wypowiedź ustna/rozmowa/diskusja [SU4] test/egzamin - ustny lub pisemny
	[BIOLL3_U06] the graduate can read with understanding simple scientific biological texts in Polish and simple texts in English	Reads with understanding scientific biological texts in Polish and texts in English.	[SU1] wypowiedź ustna/rozmowa/diskusja [SU4] test/egzamin - ustny lub pisemny
	[BIOLL3_K08] the graduate is ready to be honest, reliable, apply the principles of savoir-vivre in scientific and professional work	Understands the need for scientific integrity and honesty.	[SK1] wypowiedź ustna/rozmowa/diskusja [SK4] test/egzamin - ustny lub pisemny
[BIOLL3_K01] the graduate is ready to evaluate his own knowledge and understands the need for continuous learning and development and is open to new ideas	Knows the limitations of his own knowledge and understands the need for continuous learning and development and is open to new ideas.	[SK1] wypowiedź ustna/rozmowa/diskusja [SK4] test/egzamin - ustny lub pisemny	
Subject contents	mRNA: differences in structure of prokaryotic and eukaryotic mRNA, structure of 5' and 3' ends of mRNA, stability and degradation of mRNA. tRNA: structure, modifications of bases in tRNA, maturation of tRNA, isoacceptor tRNA. Genetic code: historical outline, properties, principle of code vacillation, deviations from code universality. Aminoacyl-tRNA synthetases: structure, classification, mechanism of action. Ribosomes: structure of prokaryotic and eukaryotic ribosomes, arrangement of active sites, characteristics of rRNA. Regulation of gene expression at the level of the translational process. Translation initiation in prokaryotic and eukaryotic cells: stages of translation initiation process, role of initiation factors (IFs), structure and role of initiator tRNAs. Elongation of translation: role of elongation factors (EFs), stages of elongation process, effect of antibiotics that inhibit elongation, mechanism of peptide bond formation. Termination of translation: mechanism of termination, role of termination factors (RF). Mechanism of selenocysteine coding. Systems of mRNA quality control. Suppressor mutations: mechanism of suppression of missense nonsense and insertion mutations. Programmable shift of the mRNA reading frame. General principles of protein folding. Selected post-translational modifications of proteins. General issues of protein degradation.		
Prerequisites and co-requisites	Basic knowledge of cell biology, molecular biology, biochemistry. Good knowledge of English.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	test - includes the degree of mastery of the material covered in the lectures in written form	51.0%	100.0%
Recommended reading	<p>Basic literature</p> <ol style="list-style-type: none"> <li>1. Molecular Cell Biology, Lodish H., Berk A., Zipursky S.L., Matsudaira P., Baltimore D., Darnell J.E.; W.H. Freeman and Company, 2016</li> <li>2. Molecular Biology of the Cell, Alberts B., Johnson A., Lewis J., Raff M., Roberts K., Walter P.; 2022</li> <li>3. Genes VIII, Lewin B., Benjamin Cummings, 2014</li> </ol>		

	Supplementary literature	<p>1. Biochemistry, Berg J.M., Stryer L., Tymoczko J.L., Polish edition, PWN, 2019</p> <p>2. Cytobiochemistry, Klyszejko-Stefanowicz L., PWN 2022</p> <p>3. Słomińska-Wojewódzka M, Sandvig, K. The Role of Lectin-Carbohydrate Interactions in the Regulation of ER-Associated Protein Degradation. <i>Molecules</i>, 2015, 20: 9816-9846.</p> <p>4. Nowakowska-Gołacka J, Sominka H, Sowa-Rogozińska N, Słomińska-Wojewódzka M. Toxins Utilize the Endoplasmic Reticulum-Associated Protein Degradation Pathway in Their Intoxication Process. 2019, <i>Int J Mol Sci</i>, 20 (6).</p>
	eResources addresses	
Example issues/ example questions/ tasks being completed	<p>Differences in the course of translation between prokaryotic and eukaryotic cells.</p> <p>Mechanisms of regulation of translation initiation.</p>	
Work placement	Not applicable	

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