

Subject card

Subject name and code	Molecular biology with biotechnology, PG_00079896						
Field of study	Biology						
Date of commencement of studies	October 2023	Academic year of realisation of subject				2024/2025	
Education level	undergraduate studies	Subject group					
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				3.0	
Learning profile	academic	Assessment form					
Conducting unit	Pracownia Biologii i Biotechnologii Bakteriofagów -> Katedra Biologii Molekularnej -> Faculty of Biology -> Rektor						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Grzegorz Węgrzyn				
	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		0.0		0.0	30
Subject objectives	Knowledge and understanding of the structure and function of nucleic acids (DNA and RNA) and proteins, as well as understanding the processes involved in the duplication and expression of genetic material, including the regulation of DNA replication, control of transcription and translation, and post-transcriptional modification of RNA and post-translational modification of proteins. Knowledge of various molecular biology techniques and the ability to use them in practice. The ability to work in a molecular biology laboratory using appropriate research tools and to analyze and develop results.						
Learning outcomes	Course outcome		Subject outcome			Method of verification	
	BIOLL3_W02		Knows the structure and properties of DNA, RNA and proteins. Understands the mechanisms of gene expression regulation and genetic material replication. Understands the mechanisms of mutations, DNA repair processes and genetic recombination. Can use knowledge of the structure and function of nucleic acids and proteins in constructing genetically modified organisms for biotechnological purposes.			[SW4] test/exam - oral or written	
	BIOLL3_W14		Is able to plan and conduct basic experiments in molecular biology, including DNA and protein studies.			[SW4] test/exam - oral or written	
Subject contents	Lecture topics: DNA and RNA structure; Organization and duplication of genetic material of viruses, bacteria and eukaryotic cells; Gene structure; DNA replication - replication of prokaryotic, eukaryotic genomes and plasmid DNA; Stages of gene expression in prokaryotic and eukaryotic cells: transcription, mRNA maturation, translation. Examples of gene expression regulation at different stages: operon and regulon models, catabolic repression, stringent control, RNA interference. Fundamentals of genetic engineering.						

Prerequisites and co-requisites	Completed courses in chemistry, as part of the study program Knowledge in chemistry and the ability to use it in the laboratory (preparing solutions and buffers, work safety)		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Test	51.0%	100.0%
Recommended reading	Basic literature		<p>1. Used during classes: Terry A. Brown, "Genomy", Wydawca: Wydawnictwo Naukowe PWN, Warszawa, 2019 Elisabeth Coleger, "Podstawy biologii molekularnej", Wydawca: Ridero IT Solution, 2024</p> <p>2. studied independently by the student:</p> <p>Piotr Węgleński, "Genetyka molekularna", Wydawca: Wydawnictwo Naukowe PWN, 2024</p>
	Supplementary literature		nie dotyczy
	eResources addresses		Adresy na platformie eNauczanie:

<p>Example issues/ example questions/ tasks being completed</p>	<p>1. In human fibroblasts (skin cells), the replicable genetic material in the form of DNA is found in:</p> <ul style="list-style-type: none"> • Golgi apparatus • Autophagosomes • Chloroplasts • Cell nucleus • Lysosomes • Mitochondria <p>2. By examining the transcriptome and proteome of given cells, it is possible to determine the levels of all macromolecules belonging to the following groups:</p> <ul style="list-style-type: none"> • Proteins • DNA • Lipids • Monosaccharides • Polysaccharides • RNA <p>3. Uracil is a nitrogenous base found in:</p> <ul style="list-style-type: none"> • Proteins • A-form DNA • B-form DNA • Z-form DNA • mRNA • rRNA <p>4. In all polypeptides produced during translation on ribosomes, one can distinguish:</p> <ul style="list-style-type: none"> • 3 End • 5 End • C (Carboxyl) End • N (Amino) End • Lipid End • Carbohydrate End <p>5. Indicate the correct information about the genetic code:</p> <ul style="list-style-type: none"> • It is a set of rules for coding amino acids in proteins by nucleotide triplets in nucleic acids. • With few exceptions, it is universal and evolutionarily conserved from bacteria to plants and animals. • It is completely different in prokaryotic and eukaryotic cells • It can change within one organism as a result of mutations in individual genes. • It is unique to each individual organism, i.e. for example, to each human being. • Determines the specific site where DNA replication begins
<p>Work placement</p>	<p>Not applicable</p>

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