

Subject card

Subject name and code	Principles of molecular and cellular biology, PG_00120419						
Field of study	Marine Biotechnology						
Date of commencement of studies	October 2025		Academic year of realisation of subject		2025/2026		
Education level	Master's 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	1		Language of instruction		English		
Semester of study	1		ECTS credits		2.0		
Learning profile	academic		Assessment form		credit		
Conducting unit	UG Institute of Biotechnology -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		dr hab. Andrea Lipińska				
	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		5.0		20.0	55
Subject objectives	Reinforcement of knowledge in cell and molecular biology and extension with advanced knowledge necessary for understanding molecular processes used in biotechnology and the appropriate methodology, with examples of marine organisms. The student will reinforce and expand their knowledge of the structure and genetics of pro- and eukaryotic cells, stages and regulation of gene expression, protein maturation, and more. The student will be able to propose manipulations in those processes for biotechnological purposes, including the use of marine-derived products.						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MBMU2-KW02] Has advanced knowledge of the possibilities of biotechnological use of marine resources		The student possesses advanced knowledge about the potential for biotechnological utilization of marine resources, with particular emphasis on molecular processes used in genetic engineering and marine biotechnology.		[SW4] test/exam - oral or written [SW2] presentation/project/paper/report [SW5] implementation of a problem task		
	[MBMU2-KW03] Knows and understands complex biological phenomena at the molecular level, understands their significance for an organism, marine environment and marine biotechnology		The student possesses advanced knowledge about the potential for biotechnological utilization of marine resources, with particular emphasis on molecular processes used in genetic engineering and marine biotechnology.		[SW4] test/exam - oral or written		
	[MBMU2-KW04] Knows and deeply understands advanced research methods used in marine biotechnology and related sciences		The student knows and deeply understands advanced research methods used in the study of molecular processes within marine biotechnology and related sciences.		[SW4] test/exam - oral or written		

Subject contents	Part W1: Structure and organization of the genome in prokaryotic and eukaryotic cells. Differences in the structure of prokaryotic and eukaryotic cells. Part W2: Stages of gene expression in eukaryotic cells; DNA and RNA synthesis. Reverse transcription. Synthesis of rRNA, tRNA and microRNA. Post-transcriptional processing of nucleic acids in eukaryotes. Regulation of gene expression in prokaryotes. Inheritance of genetic information. Extrachromosomal genetic elements. DNA damage repair, mutagenesis, and variability of genetic material. Homologous and site-specific recombination. Basics of genetic engineering. Translation and its inhibitors. Protein folding and degradation. Post-translational modifications of proteins and intracellular transport. Part W3: Cell cycle and its disorders. Basics of immune response. Stem cells and cellular aging, telomeres, cell death. Process of cancerogenesis. Inhibitors of molecular processes with emphasis on marine products.		
Prerequisites and co-requisites			
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	Points (30 max) from the test on lectures Part W1	51.0%	30.0%
	Points (30 max) from the test on lectures Part W2	51.0%	30.0%
	Points (30 max) from the test on lectures Part W3	51.0%	30.0%
	Points (10 max) from additional tasks (e.g., projects, graphics, problem solving)	51.0%	10.0%
Recommended reading	Basic literature	Academic books:	
		1. Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick: Lewin's GENES XII 12th Edition. Jones & Bartlett Learning; 12th edition (Edition 2017 or newer).	
		2. Bruce Alberts, Rebecca Heald, Alexander Johnson, David Morgan, Martin Raff, Keith Roberts, Peter Walter, John Wilson, Tim Hunt. Molecular Biology of the Cell, Seventh Edition. W. W. Norton & Company (Edition 2022 or newer).	
		3. Bruce Alberts, Karen Hopkin, Alexander Johnson, David Morgan, Martin Raff. Essential Cell Biology, 5th International Student Edition (Edition 2018 or newer).	
		4. George Ploppler. Principles of Cell Biology. Jones & Bartlett Publishers (Edition 2011 or newer).	
		or equivalent academic book on molecular and cell biology.	
	Supplementary literature	Publications recommended by lecturers during lectures.	
	eResources addresses		
Example issues/ example questions/ tasks being completed	The list of topics and example questions will be provided during lectures.		

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