

**Subject card**

Subject name and code	Principles of molecular and cellular biology - lecture, PG_00192223						
Field of study	Marine Biotechnology						
Date of commencement of studies	October 2026	Academic year of realisation of subject			2026/2027		
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		1.0		19.0	50
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-KW03] Has an in-depth knowledge and understanding of 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-KW02] Has an in-depth 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-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	<p><b>Part W1:</b></p> <p>Structure and organization of the genome in prokaryotic and eukaryotic cells. Differences in the structure of prokaryotic and eukaryotic cells.</p> <p><b>Part W2:</b></p> <p>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.</p> <p><b>Part W3:</b></p> <p>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.</p>																	
Prerequisites and co-requisites																		
Assessment methods and criteria	<table border="1"> <thead> <tr> <th data-bbox="456 786 794 819">Subject passing criteria</th> <th data-bbox="799 786 1137 819">Passing threshold</th> <th data-bbox="1142 786 1481 819">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 826 794 902">Points (10 max) from additional tasks (e.g., projects, graphics, problem solving)</td> <td data-bbox="799 826 1137 902">51.0%</td> <td data-bbox="1142 826 1481 902">10.0%</td> </tr> <tr> <td data-bbox="456 909 794 958">Points (30 max) from the test on lectures Part W3</td> <td data-bbox="799 909 1137 958">51.0%</td> <td data-bbox="1142 909 1481 958">30.0%</td> </tr> <tr> <td data-bbox="456 965 794 1014">Points (30 max) from the test on lectures Part W2</td> <td data-bbox="799 965 1137 1014">51.0%</td> <td data-bbox="1142 965 1481 1014">30.0%</td> </tr> <tr> <td data-bbox="456 1021 794 1070">Points (30 max) from the test on lectures Part W1</td> <td data-bbox="799 1021 1137 1070">51.0%</td> <td data-bbox="1142 1021 1481 1070">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Points (10 max) from additional tasks (e.g., projects, graphics, problem solving)	51.0%	10.0%	Points (30 max) from the test on lectures Part W3	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 W1	51.0%	30.0%
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Recommended reading	Basic literature	<p>Academic books:</p> <ol style="list-style-type: none"> <li>Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick: Lewin's GENES XII 12th Edition. Jones &amp; Bartlett Learning; 12th edition (Edition 2017 or newer).</li> <li>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 &amp; Company (Edition 2022 or newer).</li> <li>Bruce Alberts, Karen Hopkin, Alexander Johnson, David Morgan, Martin Raff. Essential Cell Biology, 5th International Student Edition (Edition 2018 or newer).</li> <li>George Plopper. Principles of Cell Biology. Jones &amp; Bartlett Publishers (Edition 2011 or newer).</li> </ol> <p>or equivalent academic book on molecular and cell biology.</p>																
	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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