University of Gdańsk

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	**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 (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%

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.

Work placement	Not applicable

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