

**Subject card**

Subject name and code	Alternative Bio-protection - tutorials, PG_00201394						
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	2	ECTS credits			1.0		
Learning profile	academic	Assessment form			credit		
Conducting unit	Office of the Dean of the Intercollegiate Faculty of Biotechnology -> Intercollegiate Faculty of Biotechnology UG-MUG -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor		prof. dr hab. Robert Czajkowski				
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	12.0	0.0	0.0	0.0	12
	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	12		1.0		12.0	25
Subject objectives	The course will introduce the students to alternative biological control methods used to protect marine organisms from diseases in their natural environment (natural habitats). These methods include promising and novel biological control approaches such as (oral) vaccines, probiotics, bacteriophage therapy, and the application of light and photosensitizers (photodynamic inactivation) to minimize the impact of pathogens. Likewise, students will also be introduced to the issues of social aspects of industrial (marine) food, enzyme, metabolite production, and related risks						
Learning outcomes	Course outcome		Subject outcome		Method of verification		
	[MBMU2-KK03] Is ready to apply the principles of occupational health and safety, especially in the laboratory and at sea; is responsible for their own and others' safety; can recognize hazards and take appropriate action		The student is aware of possible hazards in the workplace, is able to recognize them and take appropriate actions to counteract them.		[SK1] oral statement/conversation/discussion [SK2] presentation/project/paper/report [SK5] implementation of a problem task [SK8] observation of student's independent or team work		
	[MBMU2-KU02] Can collect and interpret empirical data; applies statistical methods and computer tools in data analysis; formulates conclusions based on empirical data		The student is able to collect, develop and interpret empirical data, is able to apply statistics and computer tools in their work. The student is able to formulate conclusions based on observations and results.		[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU5] implementation of a problem task [SU8] observation of student's independent or team work		
	[MBMU2-KU01] Can plan and conduct research in the laboratory and at sea, and to document procedures and results. Independently or under the supervision of an authorized staff member, carries out work using specialized equipment. Complies with occupational health and safety regulations.		The student is able to plan scientific research and has knowledge of how to document the results of such research.		[SU1] oral statement/conversation/discussion [SU2] presentation/project/paper/report [SU3] text preparation/written work [SU5] implementation of a problem task [SU8] observation of student's independent or team work		

Subject contents	<p><b>Biological control:</b></p> <ul style="list-style-type: none"> <li>- the idea of biological control / biological protection history, aim, examples</li> <li>- the concept of biological protection with the focus on marine (natural and artificial) environments</li> </ul> <p><b>Bacteriophages:</b></p> <ul style="list-style-type: none"> <li>- the discovery of viruses infecting bacteria,</li> <li>- the use of bacteriophages in therapy (from the past to the future)</li> <li>- marine environment as a source of valuable bacteriophage isolates and their enzymes</li> <li>- bacteriophage-centered biological control in (natural and artificial) marine environments</li> </ul> <p><b>Vaccines:</b></p> <ul style="list-style-type: none"> <li>- the history and significance of vaccinations</li> <li>- the basics of operation and production of classic and new generation vaccines</li> <li>- antibacterial and antiviral vaccines</li> <li>- vaccination of aquatic organisms,</li> <li>- the role of adjuvants with the focus on adjuvants of marine origin</li> </ul> <p><b>Photobiology:</b></p> <ul style="list-style-type: none"> <li>- basic biological mechanisms at the molecular level occurring under the influence of light</li> <li>- demonstration of photobiology's importance for biotechnology, medicine, and connection with other fields and disciplines of science.</li> <li>- characterization of modern research tools and measurement methods used in photobiology, related fields, and scientific disciplines</li> </ul>						
Prerequisites and co-requisites	basic knowledge of microbiology, molecular biology, genetics						
Assessment methods and criteria	<table border="1"> <thead> <tr> <th>Subject passing criteria</th> <th>Passing threshold</th> <th>Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>activity during classes</td> <td>51.0%</td> <td>100.0%</td> </tr> </tbody> </table>	Subject passing criteria	Passing threshold	Percentage of the final grade	activity during classes	51.0%	100.0%
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Recommended reading	Basic literature	T. W. Fisher & Thomas S. Bellows & L. E. Caltagirone & D. L. Dahlsten & Carl B. Huffaker & G. Gordh "Handbook of Biological Control: Principles and Applications of Biological Control" (Academic Press)  Male, J. Brostoff, D. B. Roth, I. Roitt "Immunology" (Mosby Inc.)  I. M. Hamblin and G. Jori "Medical and Environmental applications" (RSC Publishing)  E. Kutter, A. Sulakvelidze "Bacteriophages biology and application" (CRC Press)
	Supplementary literature	Before the classes, the students will be provided with appropriate, relevant learning materials (experimental and review publications, book chapters, reports)
	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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