

**Subject card**

<b>Subject name and code</b>	Marine Optics - laboratory, PG_00206212						
<b>Field of study</b>	Oceanography						
<b>Date of commencement of studies</b>	October 2026	<b>Academic year of realisation of subject</b>			2026/2027		
<b>Education level</b>	Master's studies	<b>Subject group</b>			Obligatory subject group in the field of study Optional subject group Subject group related to scientific research in the field of study		
<b>Mode of study</b>	full-time studies	<b>Mode of delivery</b>			at the university		
<b>Year of study</b>	1	<b>Language of instruction</b>			Polish		
<b>Semester of study</b>	2	<b>ECTS credits</b>			2.0		
<b>Learning profile</b>	academic	<b>Assessment form</b>			credit		
<b>Conducting unit</b>	Laboratory of Physical Oceanography -> Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector						
<b>Name and surname of lecturer (lecturers)</b>	Subject supervisor		dr Aleksandra Cupiał				
	Teachers						
<b>Lesson types</b>	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	0.0	0.0	30.0	0.0	0.0	30
	E-learning hours included: 0.0						
<b>Learning activity and number of study hours</b>	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
<b>Subject objectives</b>	Presentation of topics and methods applicable to (a) - the analysis of the optical state of water and (b) - the attenuation of radiant energy in the water column within the framework of linear optics in scalar formulation						

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[OCEANMU2-W02] knows and understands complex processes and phenomena occurring in the marine environment, with particular emphasis on the coastal zone, as well as complex relationships between living and non-living elements of the aquatic environment	knows and understands complex processes and phenomena of marine optics in ocean and coastal waters including the interaction of light with marine life.	[SW4] test/exam - oral or written [SW5] implementation of a problem task
	[OCEANMU2-U01] is able to formulate and solve complex and unusual problems regarding the functioning of individual components of the marine environment using knowledge from various fields and scientific disciplines and propose solutions	is able to formulate and solve complex and unusual problems of marine optics using mathematical and computational techniques as well as knowledge from various fields and scientific disciplines and propose solutions	[SU4] test/exam - oral or written [SU5] implementation of a problem task
	[OCEANMU2-K03] is ready to effectively organize his/her own work, is active and persistent and punctuality in completing tasks, is ready to carrying out evaluation of their own activities	is ready to effectively organize his/her own work on assigned problems on marine optics, is active and persistent and punctuality in completing tasks, is ready to carrying out evaluation of their own activities	[SK5] implementation of a problem task [SK8] observation of student's independent or team work
	[OCEANMU2-W03] has an in-depth understanding of research methods used in oceanography and related sciences, and interprets their mechanisms and interrelationships across different spatial and temporal scales	knows and understands research methods used in marine optics	[SW4] test/exam - oral or written [SW5] implementation of a problem task
[OCEANMU2-U06] is able to use specialized computer software as well as advanced mathematical and statistical methods to analyze data and describe processes and phenomena occurring in the marine and coastal environment; evaluates their reliability and usefulness and performs critical analysis	can use mathematical methods and mathematical software to analyze data and solve marine optics problems referring to processes in ocean and coastal waters.	[SU5] implementation of a problem task	
Subject contents	<ol style="list-style-type: none"> <li>1. Definitions of objective and subjective photometry;</li> <li>2. Spectral analysis of attenuation coefficients of optically active constituents in seawater</li> <li>3. Simplified solutions to the radiative transfer and illumination equations (single and quasi-single scattering);</li> <li>4. Analysis and interpretation of measurement data.</li> </ol>		
Prerequisites and co-requisites	The basics of single-variable calculus and first order, linear differential equations.		
Assessment methods and criteria	Subject passing criteria	Passing threshold	Percentage of the final grade
	final assessment	51.0%	80.0%
	problems solved in class	51.0%	20.0%
Recommended reading	Basic literature	Jerzy Dera 2003, Fizyka morza, PWN, 540	
	Supplementary literature	Mobley C.D., 1994, Light and water - radiative transfer in natural waters, Wyd. Academic Press, London, 592 <a href="http://www.oceanopticsbook.info">www.oceanopticsbook.info</a> (Ocean optics web book)	
	eResources addresses		
Example issues/ example questions/ tasks being completed	Solve a simplified radiative transfer equation		
Work placement	Not applicable		

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