



Subject card

Subject name and code	Elements of Modern Physics, PG_00060543						
Field of study	Naval Architecture and Offshore Structures						
Date of commencement of studies	October 2023	Academic year of realisation of subject			2025/2026		
Education level	first-cycle studies	Subject group			Obligatory subject group in the field of study Subject group related to scientific research in the field of study		
Mode of study	Full-time studies	Mode of delivery			at the university		
Year of study	3	Language of instruction			Polish		
Semester of study	5	ECTS credits			4.0		
Learning profile	general academic profile	Assessment form			assessment		
Conducting unit	Zakład Energetyki i Automatyki Morskiej -> Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. inż. Małgorzata Śmiałek-Telega					
	Teachers						
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	15.0	15.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Additional information: N/A						
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	60	6.0	34.0	100		
Subject objectives	N/A						
Learning outcomes	Course outcome	Subject outcome			Method of verification		
	[K6_W08] has knowledge of physics, including solid state physics and optics, necessary to understand the basic physical phenomena occurring in ocean engineering	The student has knowledge in physics, including: mechanics, thermodynamics, optics, electricity and magnetism, atomic physics, nuclear physics, solid-state physics, including the necessary knowledge to understand basic phenomena occurring in the environment.			[SW1] Assessment of factual knowledge		
	[K6_U01] can obtain information from literature, databases and other sources, can verify and organize the obtained information, interpret them and form conclusions and justified opinions	The student can acquire information from various sources: literature, databases, among others. They can integrate the obtained information, interpret it, draw conclusions, and formulate new ones.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information		
	[K6_U03] can use computer-aided design, production and operation tools for ocean technology objects and systems	The student possesses the ability for self-learning.			[SU4] Assessment of ability to use methods and tools [SU3] Assessment of ability to use knowledge gained from the subject		

Subject contents	<p>Lecture:</p> <ol style="list-style-type: none"> 1. Vibrations and mechanical waves 2. RLC circuits 3. Electromagnetic waves 4. Optics in wave terms 5. Optics from a corpuscular perspective 6. Elements of condensed phase physics 7. Elements of atomic physics 8. Elements of physics and nuclear energy <p>Exercises:</p> <ol style="list-style-type: none"> 1. Vibrations 2. Mechanical waves 3. RLC circuits 4. electromagnetic waves 5. Optics <p>Laboratory:</p> <ol style="list-style-type: none"> 1. Knowledge of the principles of operation of elements in an RLC circuit 2. Knowledge of the principles of operation and the ability to connect a system containing a simple sensor 3. Simple assembly of an electronic system that performs a given action 4. Learning to program Arduino and other programs necessary for data visualization 														
Prerequisites and co-requisites	Fundamentals of differential calculus and geometry. Fundamentals of classical mechanics. Basic skills in programming														
Assessment methods and criteria	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 33%;">Subject passing criteria</th> <th style="width: 33%;">Passing threshold</th> <th style="width: 33%;">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Laboratory</td> <td>50.0%</td> <td>30.0%</td> </tr> <tr> <td>Lecture</td> <td>50.0%</td> <td>40.0%</td> </tr> <tr> <td>Problems</td> <td>50.0%</td> <td>30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Laboratory	50.0%	30.0%	Lecture	50.0%	40.0%	Problems	50.0%	30.0%
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Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> 1. List the properties of metals, insulators and semiconductors; what are the main differences between them? 2. Describe p-n junction 3. Characterise e-m waves, what differs them from mechanical ones? 4. What are the main features of laser light? 5. How does the nuclear reactor work? 														
Work placement	Not applicable														