



## 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 2024	Academic year of realisation of subject			2026/2027		
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						
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_U03] can use computer-aided design, production and operation tools for ocean technology objects and systems		The student possesses the ability for self-learning.			[SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools	
	[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.			[SU2] Assessment of ability to analyse information [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools	
	[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	

Subject contents	<p><b>Lecture:</b></p> <ol style="list-style-type: none"> <li>1. Vibrations and mechanical waves</li> <li>2. RLC circuits</li> <li>3. Electromagnetic waves</li> <li>4. Optics in wave terms</li> <li>5. Optics from a corpuscular perspective</li> <li>6. Elements of condensed phase physics</li> <li>7. Elements of atomic physics</li> <li>8. Elements of physics and nuclear energy</li> </ol> <p><b>Exercises:</b></p> <ol style="list-style-type: none"> <li>1. Vibrations</li> <li>2. Mechanical waves</li> <li>3. RLC circuits</li> <li>4. electromagnetic waves</li> <li>5. Optics</li> </ol> <p><b>Laboratory:</b></p> <ol style="list-style-type: none"> <li>1. Knowledge of the principles of operation of elements in an RLC circuit</li> <li>2. Knowledge of the principles of operation and the ability to connect a system containing a simple sensor</li> <li>3. Simple assembly of an electronic system that performs a given action</li> <li>4. Learning to program Arduino and other programs necessary for data visualization</li> </ol>														
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" data-bbox="448 943 1487 1081"> <thead> <tr> <th data-bbox="448 943 798 981">Subject passing criteria</th> <th data-bbox="802 943 1141 981">Passing threshold</th> <th data-bbox="1145 943 1487 981">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 981 798 1010">Problems</td> <td data-bbox="802 981 1141 1010">50.0%</td> <td data-bbox="1145 981 1487 1010">30.0%</td> </tr> <tr> <td data-bbox="448 1010 798 1039">Lecture</td> <td data-bbox="802 1010 1141 1039">50.0%</td> <td data-bbox="1145 1010 1487 1039">40.0%</td> </tr> <tr> <td data-bbox="448 1039 798 1081">Laboratory</td> <td data-bbox="802 1039 1141 1081">50.0%</td> <td data-bbox="1145 1039 1487 1081">30.0%</td> </tr> </tbody> </table>			Subject passing criteria	Passing threshold	Percentage of the final grade	Problems	50.0%	30.0%	Lecture	50.0%	40.0%	Laboratory	50.0%	30.0%
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Problems	50.0%	30.0%													
Lecture	50.0%	40.0%													
Laboratory	50.0%	30.0%													
Recommended reading	Basic literature	David Halliday, Robert Resnick, Jearl Walker, Podstawy fizyki. T. 1-5, Wydawnictwo Naukowe PWN, 2012 J. Orear, Fizyka, tom 1 i 2, Warszawa 1998 A. Januszajtis, Fizyka dla Politechnik, tom 1-3, Warszawa 1991 J. Massalski, M. Massalska, Fizyka dla Inżynierów, tom 1 i 2, Warszawa 2013													
	Supplementary literature	<a href="https://openstax.org/details/books/university-physics-volume-1">https://openstax.org/details/books/university-physics-volume-1</a>  <a href="https://openstax.org/details/books/university-physics-volume-2">https://openstax.org/details/books/university-physics-volume-2</a>  <a href="https://openstax.org/details/books/university-physics-volume-3">https://openstax.org/details/books/university-physics-volume-3</a>													
	eResources addresses	Adresy na platformie eNauczanie:													
Example issues/ example questions/ tasks being completed	<ol style="list-style-type: none"> <li>1. List the properties of metals, insulators and semiconductors; what are the main differences between them?</li> <li>2. Describe p-n junction</li> <li>3. Characterise e-m waves, what differs them from mechanical ones?</li> <li>4. What are the main features of laser light?</li> <li>5. How does the nuclear reactor work?</li> </ol>														
Work placement	Not applicable														