University of Gdańsk

Subject card

Subject name and code	Physics for Oceanographers - lecture, PG_00205217		
Field of study	Oceanography		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's 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	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	academic	Assessment form	exam
Conducting unit	Laboratory of Physical Oceanography -> Department of Physical Oceanography and Climate Research -> Faculty of Oceanography and Geography -> Rector		
Name and surname of lecturer (lecturers)	Subject supervisor	dr Wojciech Brodziński	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	40.0	0.0	0.0	0.0	0.0	40

E-learning hours included: 0.0

Additional information:

Lecture with a multimedia presentation.

If necessary, up to 6 hours of classes can be conducted remotely.

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	40	2.0	58.0	100

Subject objectives

1. Familiarizing students with basic physical phenomena and processes, the laws governing them and methods of their research.

2. Providing knowledge and developing skills necessary to:

- using the methods of higher mathematics to describe physical phenomena and the physical interpretation of the obtained mathematical solutions;

- carrying out observations of physical pjenomena; collecting, analyzing and interpreting data.

3. Development of creative thinking skills.

4. Creating a basis for the effective use of subsequent courses on marine physics and other areas of oceanography.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[OCEANL3-W02] has a broad knowledge and understanding of physical, biological, chemical, and geological processes and phenomena occurring in aquatic environments, with particular emphasis on the marine environment	K_W02 - Understands and correctly describes the basic physical phenomena occurring in nature, including the marine environment, and the laws governing them	[SW4] test/exam - oral or written
[OCEANL3-W01] has an advanced knowledge and understanding of the terminology used in oceanography and related exact and natural sciences (in Polish and a selected foreign language)	K_W01 - Knows and understands the terminology used in physics at an advanced level	[SW4] test/exam - oral or written
[OCEANL3-U04] is able to independently search for information in Polish and foreign specialist literature, as well as on the Internet and in databases	K_U04 - Is able to independently search for information in Polish and English-language specialized literature, as well as on the Internet within the scope of the subject.	[SU4] test/exam - oral or written

Subject contents

A.1 Motion of a material point: Characteristics of motion. Uniform linear motion. Non-uniform linear motion. Motion on a plane. Circular motion. Relativity of motion.

A.2 Dynamics: Force. Newton's 1st - 3rd principles of dynamics. Types of forces in nature. Inertial and non-inertial reference frames, inertial forces. Momentum. Principle of conservation of momentum. Work. Conservative and non-conservative forces. Mechanical energy. Principle of conservation of mechanical energy.

A.3 Mechanical oscillations: Parameters describing harmonic oscillations. Equation of vibrations of a harmonic oscillator. Energy in oscillating motion. Free, damped and forced oscillations. Resonance phenomena.

A.4 Waves: Definition of a wave. Classification of waves. Parameters characterizing a wave. Wave phenomena.

A.5 Electricity and magnetism (selected elements). Electromagnetic waves. Spectrum of electromagnetic radiation.

A.6 Corpuscular-wave nature of light.

A.7 Thermodynamics: Basic concepts: temperature, heat. Mechanisms of heat exchange. The first law of thermodynamics. Ideal gas and its transformations.

A.8 Elements of fluid statics: hydrostatic pressure, Pascal's law, buoyancy force, Archimedes' law.

Prerequisites and co-requisites

Knowledge of the basics of higher mathematics.The prerequisite for taking the exam is a passing grade in the auditory and laboratory exercises in Physics for oceanographers.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam	51.0%	100.0%

Recommended reading

Basic literature	1. Samuel J. Ling, William Moebs , Jeff Sanny, 2018, Fizyka dla szkół wyższych, OpenStax Polska 2. Stanisław R. Massel, 2010. Procesy hydrodynamiczne w ekosystemach morskich. Wydawnictwo Uniwersytetu Gdańskiego.
Supplementary literature	1. Jearl Walker, 2011. Podstawy fizyki. Zbiór zadań. Wydawnictwo: Naukowe PWN. 2. Paul G. Hewitt, 2010. Fizyka wokół nas Wydawnictwo Naukowe PWN. 3. David Halliday, Robert Resnick, Jearl Walker, 2007. Podstawy fizyki - tom 1. Mechanika. Wydawnictwo Naukowe PWN. 4. David Halliday, Robert Resnick, Jearl Walker, 2007. Podstawy fizyki - tom 2. Mechanika, drgania i fale, termodynamika. Wydawnictwo Naukowe PWN. 5. David Halliday, Robert Resnick, Jearl Walker, 2007. Podstawy fizyki - tom 3. Elektryczność i magnetyzm. Wydawnictwo Naukowe PWN. 6. David Halliday, Robert Resnick, Jearl Walker, 2007. Podstawy fizyki - tom 4. Fale elektromagnetyczne, optyka i teoria względności. Wydawnictwo Naukowe PWN.

	eResources addresses	
Example issues/ example questions/ tasks being completed		
Work placement	Not applicable	

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