

## Subject card

|                                             |                                                                                                                                                                                                                                                                                                                                                                                         |                                                          |                                                                                                                                                                              |                                     |                                                                                                                             |            |     |
|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|------------|-----|
| Subject name and code                       | Physics - classes , PG_00200177                                                                                                                                                                                                                                                                                                                                                         |                                                          |                                                                                                                                                                              |                                     |                                                                                                                             |            |     |
| Field of study                              | Marine Hydrography                                                                                                                                                                                                                                                                                                                                                                      |                                                          |                                                                                                                                                                              |                                     |                                                                                                                             |            |     |
| Date of commencement of studies             | October 2027                                                                                                                                                                                                                                                                                                                                                                            |                                                          | Academic year of realisation of subject                                                                                                                                      |                                     | 2027/2028                                                                                                                   |            |     |
| Education level                             | Bachelor'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                                                                                                                                                      |                                     | Polish                                                                                                                      |            |     |
| Semester of study                           | 2                                                                                                                                                                                                                                                                                                                                                                                       |                                                          | ECTS credits                                                                                                                                                                 |                                     | 2.0                                                                                                                         |            |     |
| Learning profile                            | practical                                                                                                                                                                                                                                                                                                                                                                               |                                                          | Assessment form                                                                                                                                                              |                                     | credit                                                                                                                      |            |     |
| 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                                                                                                                                                                                                                                                                                                                                                                   | 0.0                                                      | 30.0                                                                                                                                                                         | 0.0                                 | 0.0                                                                                                                         | 0.0        | 30  |
|                                             | 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                                                                                                                                                                                                                                                                                                                                                                   | 30                                                       |                                                                                                                                                                              | 2.0                                 |                                                                                                                             | 18.0       | 50  |
| Subject objectives                          | 1. Providing knowledge and developing skills in the use of higher mathematics to describe physical phenomena and the physical interpretation of the obtained mathematical solutions.<br><br>2. Acquiring calculating proficiency in solving basic physical problems.<br><br>3. Creating the basis for the effective use of subsequent courses on marine physics and marine hydrography. |                                                          |                                                                                                                                                                              |                                     |                                                                                                                             |            |     |
| Learning outcomes                           | Course outcome                                                                                                                                                                                                                                                                                                                                                                          |                                                          | Subject outcome                                                                                                                                                              |                                     | Method of verification                                                                                                      |            |     |
|                                             | [HML3-U04] is able to use analytical, simulation and experimental methods to identify, formulate and solve engineering tasks                                                                                                                                                                                                                                                            |                                                          | is able to use physical and mathematical methods to formulate and solve engineering tasks                                                                                    |                                     | [SU1] oral statement/conversation/discussion<br>[SU4] test/exam - oral or written<br>[SU5] implementation of a problem task |            |     |
|                                             | [HML3-W01] knows and understands, at an advanced level, selected facts, phenomena and processes, as well as methods and theories concerning them, explaining the complex relationships between them, constituting basic general knowledge in the field of scientific disciplines forming the theoretical foundations specific to the field of study                                     |                                                          | knows at an advanced level the physical basis of phenomena and processes occurring in the marine environment and the methods used in oceanographic and hydrographic research |                                     | [SW4] test/exam - oral or written<br>[SW1] oral statement/conversation/discussion<br>[SW5] implementation of a problem task |            |     |

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| Subject contents                                               | Auditory exercises will include solving exercises illustrating selected topics from the lecture:<br><br>1. Motion of a material point: Characteristics of motion. Various types of motion (uniform linear motion; non-uniform linear motion; motion on a plane; circular motion). Relativity of motion.<br><br>2. Dynamics: Force. I III Newton's laws of motion. Types of forces in nature. Momentum. The principle of conservation of momentum. Work. Conservative forces i unconservative. Mechanical energy. The principle of conservation of energy.<br><br>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.<br><br>4. Basics of wave motion. Description of a plane wave, parameters characterizing the wave. |                                                                                                                                                                                                                                                                                                                                                                                      |                               |
| Prerequisites and co-requisites                                | Knowledge of the basics of higher mathematics.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                      |                               |
| Assessment methods and criteria                                | Subject passing criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Passing threshold                                                                                                                                                                                                                                                                                                                                                                    | Percentage of the final grade |
|                                                                | Final test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 51.0%                                                                                                                                                                                                                                                                                                                                                                                | 70.0%                         |
|                                                                | Short entry tests                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 51.0%                                                                                                                                                                                                                                                                                                                                                                                | 30.0%                         |
|                                                                | Activity (extra points, max. +10%)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 51.0%                                                                                                                                                                                                                                                                                                                                                                                | 0.0%                          |
| Recommended reading                                            | Basic literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1. Samuel J. Ling, William Moebs , Jeff Sanny, 2018, Fizyka dla szkół wyższych, OpenStax Polska<br><br>2. David Halliday, Robert Resnick, Jearl Walker, 2007. Podstawy fizyki - tom 1. Mechanika. Wydawnictwo Naukowe PWN.<br><br>3. David Halliday, Robert Resnick, Jearl Walker, 2007. Podstawy fizyki - tom 2. Mechanika, drgania i fale, termodynamika. Wydawnictwo Naukowe PWN. |                               |
|                                                                | Supplementary literature                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1. Orear J.: Fizyka. Tom 1 i 2. WNT, 2008.<br><br>2. Jearl Walker, 2011. Podstawy fizyki. Zbiór zadań. Wydawnictwo: Naukowe PWN.                                                                                                                                                                                                                                                     |                               |
|                                                                | eResources addresses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                      |                               |
| Example issues/<br>example questions/<br>tasks being completed | 1. A ball was dropped from a height of $h = 20$ m. What is its speed at the earth's surface?<br><br>2. Based on the equation of harmonic motion $x(t)$ , determine the speed and acceleration in this motion for a given instant of time $t$ .<br><br>3. A car with a mass of 1500 tons initially moving at a speed of 50 km/h begins to brake and stops after travelling a distance of 30 m. Calculate the braking force.                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                      |                               |
| Work placement                                                 | Not applicable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                      |                               |

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