| 1. | **Field of study** | **Environmental Protection** |
|---|---|---|
| 2. | Faculty | Faculty of Natural Sciences |
| 3. | Academic year of entry | 2019/2020 (winter term) |
| 4. | Level of qualifications/degree | first-cycle studies |
| 5. | Degree profile | general academic |
| 6. | Mode of study | full-time |

## Module: Physics

**Module code:** 1OS_04

**1. Number of the ECTS credits:** 5

**2. Learning outcomes of the module**

| code | description | learning outcomes of the programme | level of competence (scale 1-5) |
|---|---|---|---|
| 1OS_04_1 | Zna podstawowe prawa przyrody | 1OS_U02_P<br>1OS_W01_P | 4<br>4 |
| 1OS_04_2 | knows the basic phenomena occurring in the nature | 1OS_U02_P<br>1OS_W01_P | 4<br>4 |
| 1OS_04_3 | wykazuje znajomość modeli matematycznych na poziomie pozwalającym opisywanie zjawisk przyrodniczych; | 1OS_U02_P<br>1OS_W01_P | 3<br>3 |
| 1OS_04_4 | is able to apply basic research techniques and apparatus to study the magnetic properties of environmental samples | 1OS_U02_P<br>1OS_W01_P | 4<br>4 |
| 1OS_04_5 | uses a computer to the extent necessary to search for information and analysis, | 1OS_W01_P | 4 |
| 1OS_04_6 | understands the need for self-learning and the need to improve the knowledge and skills | 1OS_K01_P<br>1OS_U04_P | 5<br>5 |
| 1OS_04_7 | Zna podstawową, z zakresu wykładu, terminologię naukową w języku angielskim | 1OS_W08_P | 4 |

**3. Module description**

| | |
|---|---|
| **Description** | During lectures student meets the following issues:<br>Standards and units. The measurement of physical quantities. Vectors. Kinematics. The reference system. The phenomenon of movement. One-dimensional movement and the movement in the plane. The concept of displacement, velocity and acceleration. Projections. Curved path motion. Relative movement. Dynamics of material point. Mass, momentum and strength. Newton 's laws. Application of Newton's principles. Work done by the |

| | |
|---|---|
| | force of the fixed and variable. Kinetic energy. Power. Potential energy. The principle of conservation of energy. Conservative and non-conservative forces. The principle of conservation of momentum. The center of mass. Movement of the center of mass. Collision. Mechanics of rigid bodies. Moment of inertia. Moment of force. Energy and work in rotation. Gravity. The law of universal gravitation. Kepler's laws of planetary motion. Weight. The gravitational field. Black holes. Oscillatory motion. Harmonic force. Pendulum. Energy harmonic motion. Damped harmonic oscillator. Forced oscillations and resonance. Mechanics of liquids. The concept of pressure. Pascal's Law, Archimedes, Bernoulli. Waves in elastic media. Thermodynamics. Heat and temperature. Zeroth law of thermodynamics. Thermometry. Thermal expansion. Heat. Latent heat. Heat transport. Ideal gas and real gas. Electrostatics. Structure of matter. Electric charge. Conductors and insulators. Coulomb's law. Electric field. Electric dipole. Gauss' law and its applications. Faraday cage. Current, electrical resistance. Ohm's law. Electromotive force. Electrical circuits. Magnetic field. Geomagnetism. Experience Oersted. Lorenz formula. Ampere's law. The magnetic flux. Law Biot - Savart law. Nature of light. Wave-particle duality. The spectrum of electromagnetic waves. Refractive index. Laws of reflection and refraction. Diffraction and interference. Polarization, birefringence.<br>At the laboratory classes, the student:<br>- Acquainted with the basic principles of safe work in physics laboratory<br>- Take note of the type of measuring equipment, apparatus and instruments used in physics laboratory<br>- Acquainted with the theory of the laboratory techniques used in the measurement of physical properties<br>- Perform practical exercises under the relevant instructions for exercises<br>- Develop the ability to perform simple physical experiments<br>- Meets the physical phenomena occurring in nature<br><br>In class student consultation:<br>solves the problems arising in the course of development issues, the preparation of the reports of the exercise<br><br>As part of the student's own work:<br>based on lecture notes and supplementary literature seeks to consolidate the acquired knowledge;<br>prepares indicated by the leading issues using the available sources, including electronic<br>developing the results of the experiments and prepare a report in accordance with the formula provided |
| **Prerequisites** | Knowledge of basic physics |

**4. Assessment of the learning outcomes of the module**

| code | type | description | learning outcomes of the module |
|---|---|---|---|
| 1OS_04_w_1 | kolokwium | Before performing the exercises the student is queried with the fundamental issues related to the implementation of a given exercise | 1OS_04_1, 1OS_04_2, 1OS_04_3, 1OS_04_4, 1OS_04_5, 1OS_04_6, 1OS_04_7 |
| 1OS_04_w_2 | Aktywność na zajęciach | Validation of the analysis carried out by the student manual for the steps needed to make proper exercise and compliance with the principles of work safety. Evaluation of the implementation of individual tasks in accordance with the instructions and the instructions the teacher. | 1OS_04_1, 1OS_04_2, 1OS_04_3, 1OS_04_4, 1OS_04_5, 1OS_04_6, 1OS_04_7 |
| 1OS_04_w_3 | egzamin pisemny | Revision knowledge gained in lectures and recommended syllabus literature: basic and supplementary. The condition of the test is a pass laboratory classes. | 1OS_04_1, 1OS_04_2, 1OS_04_3, 1OS_04_4, 1OS_04_6, 1OS_04_7 |

**5. Forms of teaching**

| code | form of teaching | | | required hours of student's own work | | assessment of the learning outcomes of the module |
|---|---|---|---|---|---|---|
| | type | description (including teaching methods) | number of hours | description | number of hours | |
| 1OS_04_fs_1 | lecture | Lectures in the field of university physics course using audio-visual aids and demonstrations to illustrate the issues discussed in the lecture | 45 | Analysis of the lecture notes; work with the literature | 45 | 1OS_04_w_2, 1OS_04_w_3 |
| 1OS_04_fs_2 | laboratory classes | Exercises in the physics laboratory: using different devices and measuring equipment, students perform exercises according to the instructions and get to know the physical phenomena occurring in nature. Perform exercises in the field of mechanics, molecular physics and heat, electricity and optics. | 15 | Preparing for the exercises based on the issues listed in the instructions for exercises and given the literature. | 15 | 1OS_04_w_1, 1OS_04_w_2, 1OS_04_w_3 |