



Subject card

| | | | | | | | |
|--------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------|------------------------------------------------|---------|-----|
| Subject name and code | Physics, PG_00038427 | | | | | | |
| Field of study | Hydrogen Technologies and Electromobility | | | | | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | | | 2024/2025 | | |
| Education level | first-cycle 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 | 1 | ECTS credits | | | 7.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Department of Metrology and Information Systems -> Faculty of Electrical and Control Engineering | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Maciej Łuszczek | | | | | |
| | Teachers | dr inż. Maria Chomka dr hab. inż. Maciej Łuszczek | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 45.0 | 30.0 | 0.0 | 0.0 | 0.0 | 75 |
| | 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 | 75 | 10.0 | | 90.0 | | 175 |
| Subject objectives | Introduction to the basic laws of physics. Understanding of the role of physics in our environment and introduction of the methods of mathematically precise description of natural phenomena. Implementation of the differential and integral calculus in physical problems. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K6_U01] Is able to obtain information from literature, databases and other sources, integrate them, interpret them and draw conclusions and formulate opinions; has the ability to self-educate m.in. in order to improve professional competences | The student is able to use various bibliographic resources and he/she can make correct conclusions. | | | [SU1] Assessment of task fulfilment | | |
| | [K6_W02] has knowledge of physics and chemistry including electrostatics, electromagnetism, electrodynamics, wave motion, acoustics, mechanics, thermodynamics, optics, solid state physics; including knowledge necessary to understand the basic physical phenomena occurring in hydrogen devices, systems and installations as well as automation and robotics systems | The student acquires the ability to associate physical phenomena and appropriate relationships, which can be used to solve real problems in various fields of technology, provided that appropriate mathematical relationships are used. | | | [SW1] Assessment of factual knowledge | | |
| [K6_K02] can work in a group taking on different roles in it | The student is able to cooperate with the teacher and the colleagues when analyzing physical problems in order to search for the correct solution. | | | [SK2] Assessment of progress of work | | | |

| Subject contents | <p>1. Mechanics</p> <p>Kinematics: basic concepts and quantities, rectilinear motion with constant acceleration, relativity of motion, projectile motion, circular motion.</p> <p>Dynamics: Newton's principles, inertial and non inertial reference systems, translational motion dynamics, rotational motion dynamics</p> <p>Conservation laws in dynamics: conservation of energy, momentum and angular momentum</p> <p>2. Gravity: Newton's law of universal gravitation, gravitational potential energy, escape velocity</p> <p>3. Vibrations and waves.</p> <p>Simple harmonic motion: equation of motion. energy, mathematical pendulum, physical pendulum, superposition of harmonic motions</p> <p>Damped harmonic motion.</p> <p>Forced vibrations and resonance.</p> <p>Waves in elastic media: classification of waves, wave propagation, superposition of waves, standing waves.</p> <p>Sound waves: audible sounds, ultra- and infrasound, standing acoustic waves, beats, Doppler's effect</p> <p>4. Thermodynamics: states of matter, heat, calorimetric calculations, ideal gas law, thermodynamic processes, kinetic theory of gases, internal energy, work in thermodynamic processes, reversible and non reversible processes, thermodynamic cycles, Carnot's engine.</p> <p>5. Wave optics essentials: Huygens principle, reflection and refraction of light, interference and diffraction of light.</p> | | | | | | | | | | | | | | |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|--|--------------------------|---------------------------------------------------------------------------------------------------|-------------------------------|--------------------------|-------------------------------------------|-------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|------|-------|-------|
| Prerequisites and co-requisites | | | | | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1"> <thead> <tr> <th data-bbox="456 1332 794 1361">Subject passing criteria</th> <th data-bbox="798 1332 1136 1361">Passing threshold</th> <th data-bbox="1139 1332 1479 1361">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1366 794 1395">Written test</td> <td data-bbox="798 1366 1136 1395">50.0%</td> <td data-bbox="1139 1366 1479 1395">25.0%</td> </tr> <tr> <td data-bbox="456 1400 794 1429">Written test</td> <td data-bbox="798 1400 1136 1429">50.0%</td> <td data-bbox="1139 1400 1479 1429">25.0%</td> </tr> <tr> <td data-bbox="456 1433 794 1462">Exam</td> <td data-bbox="798 1433 1136 1462">50.0%</td> <td data-bbox="1139 1433 1479 1462">50.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Written test | 50.0% | 25.0% | Written test | 50.0% | 25.0% | Exam | 50.0% | 50.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | | | | |
| Written test | 50.0% | 25.0% | | | | | | | | | | | | | |
| Written test | 50.0% | 25.0% | | | | | | | | | | | | | |
| Exam | 50.0% | 50.0% | | | | | | | | | | | | | |
| Recommended reading | <table border="1"> <tbody> <tr> <td data-bbox="456 1476 794 1626">Basic literature</td> <td colspan="2" data-bbox="798 1476 1479 1626"> C. Bobrowski, "Fizyka - krótki kurs" D. Halliday, R. Resnick, J. Walker, "Podstawy fizyki" </td> </tr> <tr> <td data-bbox="456 1630 794 1659">Supplementary literature</td> <td colspan="2" data-bbox="798 1630 1479 1659">R. Feynman, "Feynman Lectures on Physics"</td> </tr> <tr> <td data-bbox="456 1664 794 1756">eResources addresses</td> <td colspan="2" data-bbox="798 1664 1479 1756"> Adresy na platformie eNauczanie: FIZYKA [TWiE][2024/25] - Moodle ID: 39932 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39932 </td> </tr> </tbody> </table> | | | Basic literature | C. Bobrowski, "Fizyka - krótki kurs" D. Halliday, R. Resnick, J. Walker, "Podstawy fizyki" | | Supplementary literature | R. Feynman, "Feynman Lectures on Physics" | | eResources addresses | Adresy na platformie eNauczanie: FIZYKA [TWiE][2024/25] - Moodle ID: 39932 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39932 | | | | |
| Basic literature | C. Bobrowski, "Fizyka - krótki kurs" D. Halliday, R. Resnick, J. Walker, "Podstawy fizyki" | | | | | | | | | | | | | | |
| Supplementary literature | R. Feynman, "Feynman Lectures on Physics" | | | | | | | | | | | | | | |
| eResources addresses | Adresy na platformie eNauczanie: FIZYKA [TWiE][2024/25] - Moodle ID: 39932 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=39932 | | | | | | | | | | | | | | |

| | |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Example issues/ example questions/ tasks being completed</p> | <p>Explain basic concepts and quantities in kinematics - position, velocity, acceleration.</p> <p>Discuss three Newton's principles of dynamics.</p> <p>Explain the notion of gravitational potential energy.</p> <p>Discuss energy transfer (kinetic to potential and vice versa) during the motion of mathematical pendulum.</p> <p>What does the term "standing wave" stand for?</p> <p>Discuss two arbitrarily chosen thermodynamic processes.</p> |
| <p>Work placement</p> | <p>Not applicable</p> |

Document generated electronically. Does not require a seal or signature.