



Subject card

| | | | | | | | |
|---|--|---|-------------------------------------|------------|--|---------|-----|
| Subject name and code | Modern Physics, PG_00047661 | | | | | | |
| Field of study | Informatics | | | | | | |
| Date of commencement of studies | October 2023 | Academic year of realisation of subject | | | 2024/2025 | | |
| 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 | 2 | Language of instruction | | | Polish | | |
| Semester of study | 3 | ECTS credits | | | 3.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Zakład Fizyki Atomowej, Molekularnej i Optycznej -> Instytut Fizyki i Informatyki Stosowanej -> Faculty of Applied Physics and Mathematics | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Sebastian Bielski | | | | | |
| | Teachers | mgr inż. Michał Piłat dr inż. Sebastian Bielski dr hab. Mateusz Zawadzki dr inż. Ireneusz Linert mgr inż. Michał Jurkowski Mateusz Poniatowski dr Piotr Weber | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 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 | 3.0 | | 42.0 | 75 | |
| Subject objectives | The aim of the subject is to provide students with the basic knowledge of physics helpful in further education. | | | | | | |

| | | | |
|---------------------------------|--|--|---------------------------------------|
| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [K6_U02] can perform tasks related to the field of study in an innovative way as well as solve complex and nontypical problems, applying knowledge of physics, in changing and not fully predictable conditions | The student solves simple problems of quantum mechanics and simple problems concerning electricity and magnetism. | [SU1] Assessment of task fulfilment |
| | [K6_W02] knows and understands, to an advanced extent, selected laws of physics and physical phenomena as well as methods and theories explaining the complex relationships between them, constituting the basic general knowledge in the field of technical sciences related to the field of study | The student lists and explains the basic physical phenomena, concepts and laws concerning electromagnetism, theory of relativity and basics of quantum mechanics. | [SW1] Assessment of factual knowledge |
| | [K6_U05] can plan and conduct experiments related to the field of study, including computer simulations and measurements; interpret obtained results and draw conclusions | Ability to perform simple measurements of physical quantities and to prepare reports, including error analysis. | [SU1] Assessment of task fulfilment |
| Subject contents | <p>Lecture Electromagnetism. Electric field vector properties. Magnetic field in vacuum. Electric and magnetic field of a moving charge. Biot-Savart law. Magnetic field around a long wire. Lorentz force. Magnetic force on a current carrying wire. Ampere's laws. Interaction of two parallel long wires. Faraday's law. Maxwell's equations. Einstein's postulates. Lorentz transformation and its consequences. Polarization of light. Black body radiation. Photoelectric phenomenon. Compton effect. Bohr model. Wave-particle duality. De Broglies hypothesis. Heisenberg uncertainty relations. Schrodinger's wave equation - examples of solutions. Hydrogen. Emission and absorption of light. Stimulated emission. Laser operation principle.</p> <p>Laboratory Performing a few experiments; conclusions, error analysis</p> | | |
| Prerequisites and co-requisites | | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Lecture: final test | 50.0% | 67.0% |
| | laboratory: oral answers, reports | 50.0% | 33.0% |
| Recommended reading | Basic literature | 1. Halliday D., Resnick R., Walker J., Fundamentals of physics 2. Openstax, University physics 3. Griffiths D. J. , Introduction to Electrodynamics https://ftims.pg.edu.pl/wydzial/laboratoria-wydzialowe/experiments-physics-first-laboratory-students | |
| | Supplementary literature | 1. Sidney B. Cahn, Boris E. Nadgorny, and Paul D. Scholten, A Guide To Physics Problems. 2. Jackson J. D., Classical Electrodynamics | |
| | eResources addresses | Adresy na platformie eNauczenie: Fizyka współczesna (Informatyka)_24/25 - Moodle ID: 38888 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=38888 | |

| | |
|---|--|
| <p>Example issues/ example questions/ tasks being completed</p> | <p>How does the maximum possible kinetic energy of electrons E_k depend on the incident light intensity I? We assume that the energy of each photon is greater than the work function.</p> <p>A) E_k does not depend on I B) E_k increases linearly with I C) E_k decreases linearly with I D) more information is needed</p> <p>According to the Gauss' law the electric flux through any closed surface S</p> <p>A) is always equal to zero B) depends only on the electric charges inside S C) depends only on the electric charges outside S D) depends on both the electric charges inside and outside S</p> <p>The inductance of a solenoid depends on (choose the right answer)</p> <p>A) cross-sectional area of the wire (or the diameter of the wire) and the length of the solenoid B) the length of the solenoid and the cross-sectional area of the solenoid C) the cross-sectional area of the solenoid and the current D) the current and the cross-sectional area of the wire</p> <p>Experiment: determine the moment of inertia of a given object.</p> |
| <p>Work placement</p> | <p>Not applicable</p> |

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