



Subject card

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| Subject name and code | Physics, PG_00055063 | | | | | | |
| Field of study | Management and Production Engineering | | | | | | |
| Date of commencement of studies | October 2021 | | Academic year of realisation of subject | | 2023/2024 | | |
| 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 | 3 | | Language of instruction | | Polish | | |
| Semester of study | 5 | | ECTS credits | | 5.0 | | |
| Learning profile | general academic profile | | Assessment form | | exam | | |
| Conducting unit | Institute of Ocean Engineering and Ship Technology -> Faculty of Mechanical Engineering and Ship Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | | dr hab. inż. Małgorzata Śmiałek-Telega | | | | |
| | Teachers | | dr inż. Joanna Grochowalska dr hab. inż. Małgorzata Śmiałek-Telega dr inż. Klaudia Wrzask | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 30.0 | 15.0 | 15.0 | 0.0 | 0.0 | 60 |
| | 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 | 60 | | 4.0 | | 61.0 | 125 |
| Subject objectives | Acquiring knowledge that is the subject of modern physics | | | | | | |

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| Learning outcomes | Course outcome | Subject outcome | Method of verification |
| | [K6_U02] has the ability of self-learning and expanding knowledge in a specialized field of engineering production | The student has the ability to analyze information and use methods to expand specialist knowledge in the field of production engineering. | [SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information [SU4] Assessment of ability to use methods and tools |
| | [K6_W01] has knowledge of linear algebra, differential equations, analysis and mathematical statistics useful for modelling and interpreting mechanical systems, manufacturing processes and operating properties of devices, has structured knowledge of physics including classical mechanics, optics, electricity and magnetism, demonstrates knowledge of elements of quantum physics | The student has ordered knowledge of modern physics, optics, electricity and magnetism, demonstrates the knowledge of the elements of quantum physics | [SW1] Assessment of factual knowledge [SW3] Assessment of knowledge contained in written work and projects |
| | [K6_K03] is aware of the social role of a graduate of a technical university, understands the importance of non-technical aspects and effects of engineering activities including their impact on the environment and responsibility for decisions, sees the need to formulate and provide the public with information and opinions on the achievements of technology, correctly identifies and resolves dilemmas associated with the job of an engineer | student understands the importance of non-technical aspects and effects of engineering activities, including its impact on the environment | [SK5] Assessment of ability to solve problems that arise in practice [SK2] Assessment of progress of work |
| Subject contents | 1. Mathematical introduction. 2. Electromagnetic waves 3. Wave optics 4. Lasers 5. Lidars 6. Schrödinger equation; examples of solutions to the Schrödinger equation: 7. Models of the atom 8. Stern-Gerlach experiment and electron spin. 9. Multi-electron atoms; Zeeman effect and spin-orbit coupling; 10. Physics of the atomic nucleus 11. Radioactivity 12. Electric conductivity 13. Quantum computers | | |
| Prerequisites and co-requisites | Knowledge of classical physics | | |
| Assessment methods and criteria | Subject passing criteria | Passing threshold | Percentage of the final grade |
| | Exercises | 50.0% | 35.0% |
| | Lecture | 50.0% | 30.0% |
| | Laboratory | 50.0% | 35.0% |
| Recommended reading | Basic literature | Fizyka dla Szkół Wyższych Tom 3 https://openstax.org/details/books/fizyka-dla-szk%C3%B3%C5%82-wy%C5%BCszych-tom-3 | |
| | Supplementary literature | D. Halliday, R. Resnick, J. Walker, Podstawy fizyki, t5, PWN | |
| | eResources addresses | Podstawowe https://openstax.org/details/books/fizyka-dla-szk%C3%B3%C5%82-wy%C5%BCszych-tom-3 - OpenStax Adresy na platformie eNauczanie: PG_00055063 ZiIP Fizyka 23/24 - Moodle ID: 33433 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=33433 PG_00055063 ZiIP Fizyka 23/24 - Moodle ID: 33433 https://enauczenie.pg.edu.pl/moodle/course/view.php?id=33433 | |

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| Example issues/ example questions/ tasks being completed | <p>1. Particle-wave nature of light and matter.</p> <p>2. Heisenberg uncertainty principles. Schrödinger equation and examples of its solutions.</p> <p>3. Schrödinger equation of hydrogen atom, quantum numbers.</p> <p>4. Stern-Gerlach experiment, spin of electron.</p> <p>5. Spin-orbit coupling, total momentum of electron in atom.</p> <p>6. Zeeman phenomena, Models of nucleus: liquid drop model, Fermi gas model, shell model.</p> <p>7. Quantum statistics.</p> |
| Work placement | Not applicable |