GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

| | | | |
|---|---|---|---|
| Subject name and code | Physics, PG_00047359 | | |
| Field of study | Electronics and Telecommunications | | |
| Date of commencement of studies | October 2020 | Academic year of realisation of subject | 2020/2021 |
| Education level | first-cycle studies | Subject group | Obligatory subject group in the field of study<br>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 | 1 | Language of instruction | Polish |
| Semester of study | 2 | ECTS credits | 4.0 |
| Learning profile | general academic profile | Assessment form | exam |
| Conducting unit | Department of Atomic, Molecular and Optical Physics -> Faculty of Applied Physics and Mathematics | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Patrycja Stefańska-Ptaszek | |
| | Teachers | dr Maciej Kuna<br>dr Tomasz Neumann<br>dr inż. Patrycja Stefańska-Ptaszek | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 15.0 | 0.0 | 0.0 | 0.0 | 45 |

E-learning hours included: 0.0

Adresy na platformie eNauczanie:
Fizyka - Moodle ID: 11496
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11496
Fizyka - Moodle ID: 11496
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11496
Fizyka - Moodle ID: 11496
https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11496

**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 | 45 | 4.0 | 51.0 | 100 |

**Subject objectives**

Providing the student with the specialist knowledge concerning the basic rules of physics immediately relevant to the technical areas.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [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 | Student enumerates and explains the basic phenomena, concepts, and laws concerning classical mechanics, mechanics of fluids, statistical physics and thermodynamics, oscillatory and wave motion, geometrical and wave optics, relativistic mechanics, nuclear physics, and basics of quantum mechanics. | [SW1] Assessment of factual knowledge<br>[SU2] Assessment of ability to analyse information<br>[SK4] Assessment of communication skills, including language correctness |
| [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 | Student enumerates and explains the basic phenomena, concepts, and laws concerning classical mechanics, mechanics of fluids, statistical physics and thermodynamics. Solves simple problems of classical mechanics, statistical physics and thermodynamics. | [SU4] Assessment of ability to use methods and tools<br>[SU3] Assessment of ability to use knowledge gained from the subject<br>[SU2] Assessment of ability to analyse information<br>[SU1] Assessment of task fulfilment |

| | |
|---|---|
| Subject contents | LECTURE<br><br>1. Kinematics and dynamics of a material point. Principle of conservation of energy. Principle of conservation of momentum and angular momentum. Basic properties of gravitational field. Elements of mechanics of fluids.<br><br>2. Heat, work, internal energy, gas transformations. Elements of kinetic theory of gases. Entropy, reversible and non-reversible processes. Laws of thermodynamics.<br><br>3. Harmonic oscillator, addition of oscillations. Elastic waves. Basic properties of acoustic waves. Energy density and intensity of wave. Parameters of the medium, wave impedance.<br><br>4. Elements of geometrical optics. Wave optics: dispersion, interference, diffraction, and polarization of waves. Basics of holography. Sources of light.<br><br>5. Einstein's postulates. Lorentz's transformation and its consequences. Relativistic optics.<br><br>6. Structure of atomic nucleus. Nuclear forces. Radioactivity.<br><br>7. Wave-particle duality. Wave function. The Heisenberg uncertainty relations. Schrödinger’s equation.<br><br>PRACTICE<br><br>1. Problems on kinematics of progressive motion, description of the motion in Cartesian system. Velocity, acceleration, normal and tangential acceleration. Problems on kinematics of rotational motion, description of the motion in Cartesian system and in a polar coordinate system. Problems on dynamics of progressive motion, applications of Newton's laws. Dynamics laws in non-inertial frame of reference. Problems on conservation of energy, momentum and angular momentum.<br><br>2. Problems related to the first law of thermodynamics in the case of an ideal gas. Problems related to Maxwell distribution. Calculation of entropy changes in reversible transformations of an ideal gas.<br><br>3. Examples of harmonic motion. Basics of wave motion. Wave energy density, Poynting’s vector, wave intensity.<br><br>4. Problems related to the interference of light. Diffraction and polarization of light. Fraunhofer single slit diffraction. Malus's law. |
| Prerequisites and co-requisites | |
| Assessment methods and criteria | |

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Solving of the problems | 50.0% | 33.0% |
| Knowledge of the lecture material | 50.0% | 67.0% |

| | | |
|---|---|---|
| Recommended reading | Basic literature | 1. 1. D. Halliday, R. Resnick, J. Walker, Podstawy Fizyki tom 1-5, PWN.<br><br>2. Sawieliew I. W., Wykłady z fizyki, tom I-3, PWN.<br><br>3. Bobrowski Cz., Fizyka, WNT<br><br>4. Collection of physics problems, published at the website: www.mif.pg.gda.pl/zz/ |

| | | |
|---|---|---|
| | Supplementary literature | 1. Orear J., Fizyka, volume 1 i 2, WNT.<br><br>2. Resnick R., Halliday D., Fizyka, volume 1 i 2, PWN.<br><br>3. R.P. Feynman, Feynmana Wykłady z Fizyki, volume 1-3, PWN.<br><br>4. Bujko A., Zadania z fizyki z rozwiązaniami i komentarzami, WNT. |
| | eResources addresses | Fizyka - Moodle ID: 11496<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11496<br>Fizyka - Moodle ID: 11496<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11496<br>Fizyka - Moodle ID: 11496<br>https://enauczanie.pg.edu.pl/moodle/course/view.php?id=11496 |
| Example issues/ example questions/ tasks being completed | Conservation of energy, momentum, and angular momentum in the system of particles.<br><br>Simple harmonic motion.<br><br>Energy density of the longitudinal wave.<br><br>Universal law of radioactive decay. | |
| Work placement | Not applicable | |