



Subject card

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|---|---|---|-------------------------------------|------------|---|--|-----|
| Subject name and code | Elements of modern physics, PG_00060477 | | | | | | |
| Field of study | Mechatronics | | | | | | |
| Date of commencement of studies | October 2024 | Academic year of realisation of subject | | | | 2025/2026 | |
| 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 | 2 | Language of instruction | | | | Polish | |
| Semester of study | 4 | ECTS credits | | | | 9.0 | |
| Learning profile | general academic profile | Assessment form | | | | exam | |
| Conducting unit | Zakład Automatyki i Energetyki Morskiej -> 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 | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 45.0 | 15.0 | 15.0 | 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 | 39.0 | | 111.0 | 225 | |
| Subject objectives | N/A | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K6_W02] has a knowledge in term of physics that includes mechanics, thermodynamics, optics, electricity, magnetism, atomic physics, nuclear physics, solid state physics, including the knowledge necessary to understand basic phenomena occurring in mechatronic elements and systems and its surroundings | The student has systematic knowledge of modern physics: vibrations, mechanical waves, RLC circuits, electromagnetic waves, optics, matter waves, elements of atomic physics and nuclear energy, basics of quantum physics | | | [SW1] Assessment of factual knowledge | | |
| | [K6_U03] has self-learning skills | The student understands the importance of non-technical aspects and effects of engineering activities, including its impact on the environment. | | | [SU1] Assessment of task fulfilment [SU5] Assessment of ability to present the results of task | | |
| | [K6_U01] is able to acquire information from literature, databases and other, properly chosen sources, integrate these information, interpret them, draw conclusions and formulate opinions | The student understands the importance of non-technical aspects and consequences of engineering activities, including their impact on the environment. | | | [SU3] Assessment of ability to use knowledge gained from the subject | | |

| Subject contents | <p>Lecture:</p> <ol style="list-style-type: none"> 1. Vibrations and mechanical waves 2. RLC circuits 3. Electromagnetic waves 4. Optics in wave terms 5. Optics from a corpuscular perspective 6. Elements of condensed phase physics 7. Elements of atomic physics 8. Elements of physics and nuclear energy <p>Exercises:</p> <ol style="list-style-type: none"> 1. Vibrations 2. Mechanical waves 3. RLC circuits 4. electromagnetic waves 5. Optics <p>Laboratory:</p> <ol style="list-style-type: none"> 1. Knowledge of the principles of operation of elements in an RLC circuit 2. Knowledge of the principles of operation and the ability to connect a system containing a simple sensor 3. Simple assembly of an electronic system that performs a given action 4. Learning to program Arduino and other programs necessary for data visualization | | | | | | | | | | | | | | |
|--|--|---|--|--------------------------|-------------------|-------------------------------|----------|-------|-------|---------|-------|-------|------------|-------|-------|
| Prerequisites and co-requisites | Fundamentals of differential calculus and geometry. Fundamentals of classical mechanics. Basic skills in programming | | | | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1" data-bbox="448 943 1487 1081"> <thead> <tr> <th data-bbox="448 943 798 981">Subject passing criteria</th> <th data-bbox="802 943 1141 981">Passing threshold</th> <th data-bbox="1145 943 1487 981">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="448 981 798 1010">Problems</td> <td data-bbox="802 981 1141 1010">50.0%</td> <td data-bbox="1145 981 1487 1010">30.0%</td> </tr> <tr> <td data-bbox="448 1010 798 1039">Lecture</td> <td data-bbox="802 1010 1141 1039">50.0%</td> <td data-bbox="1145 1010 1487 1039">40.0%</td> </tr> <tr> <td data-bbox="448 1039 798 1081">Laboratory</td> <td data-bbox="802 1039 1141 1081">50.0%</td> <td data-bbox="1145 1039 1487 1081">30.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | Problems | 50.0% | 30.0% | Lecture | 50.0% | 40.0% | Laboratory | 50.0% | 30.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | | | | |
| Problems | 50.0% | 30.0% | | | | | | | | | | | | | |
| Lecture | 50.0% | 40.0% | | | | | | | | | | | | | |
| Laboratory | 50.0% | 30.0% | | | | | | | | | | | | | |
| Recommended reading | Basic literature | David Halliday, Robert Resnick, Jearl Walker, Podstawy fizyki. T. 1-5, Wydawnictwo Naukowe PWN, 2012 J. Orear, Fizyka, tom 1 i 2, Warszawa 1998 A. Januszajtis, Fizyka dla Politechnik, tom 1-3, Warszawa 1991 J. Massalski, M. Massalska, Fizyka dla Inżynierów, tom 1 i 2, Warszawa 2013 | | | | | | | | | | | | | |
| | Supplementary literature | https://openstax.org/details/books/university-physics-volume-1 https://openstax.org/details/books/university-physics-volume-2 https://openstax.org/details/books/university-physics-volume-3 | | | | | | | | | | | | | |
| | eResources addresses | Adresy na platformie eNauczanie: | | | | | | | | | | | | | |
| Example issues/ example questions/ tasks being completed | <ol style="list-style-type: none"> 1. List the properties of metals, insulators and semiconductors; what are the main differences between them? 2. Describe p-n junction 3. Characterise e-m waves, what differs them from mechanical ones? 4. What are the main features of laser light? 5. How does the nuclear reactor work? | | | | | | | | | | | | | | |
| Work placement | Not applicable | | | | | | | | | | | | | | |