COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physics

Course

Field of study Security Engineering	Year/Semester 1 / 1
Area of study (specialization)	Profile of study general academic
Level of study First-cycle studies	Course offered in Polish
Form of study full-time	Requirements compulsory

Number of hours

Lecture 30	Laboratory classes 30	Other (e.g. online)
Tutorials 15	Projects/seminars	

Number of credit points

6

Lecturers

Responsible for the course/lecturer:

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Responsible for the course/lecturer:

Prerequisites

1. Student has basic knowledge in mathematics, including algebra, analysis, theory of differential equations, probability studies, analytical geometry necessary to understand and describe basic physics-related issues (core curriculum for secondary schools, extended level).

2. Student has basic knowledge in the field of physics (core curriculum for secondary schools, basic level).

3. Student is able to obtain information from the indicated sources of literature, the Internet and other sources. Can use formulas, tables and technical calculations.

4. Student understands the need to expand their competences and is ready to cooperate in a team.

Course objective

1. To acquaint students with the basic classical physics concepts and laws, to the extent specified by the content of the curriculum relevant to the field of study, taking into account their applications in technical sciences.

2. Developing students' skills in solving problems in physics, perceiving its potential applications in the studied field.

3. Developing students' skills in solving problems in physics on the basis of acquired knowledge.

4. Acquainted with the elements of the technique of physical measurements and analysis of their results based on the knowledge obtained.

5. Developing students' teamwork skills.

6. Developing students' skills of independent learning, using literature and other sources.

Course-related learning outcomes

Knowledge

the student knows issues related to engineering (physics, chemistry, materials science, manufacturing technology, strength of materials, mechanics) [P6S_WG_01]

Skills

the student is aware of the responsibility for his/her own work and is ready to follow the rules of teamwork and take responsibility for the tasks performed together [P6S_UK_01]

the student - is able to plan and conduct experiments, including measurements and computer simulations, interpret the obtained results and draw conclusions [P6S_UK_01]

Social competences

the student is aware of the responsibility for his/her own work and is ready to follow the rules of teamwork and take responsibility for the tasks performed together [P6S_KR_02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

1. Assessment of knowledge and skills as part of the LECTURE is verified during a 90-minute written exam based on the explanation of selected physics issues presented during the lecture. In a situation where the grade of the written exam cannot be clearly determined, an oral exam is carried out. Additionally, lecture activity is evaluated. Passing rate: 50% of points.

2. Assessment of knowledge and skills in the EXERCISE is verified on the basis of a 90-minute colloquium carried out during the last class based on the calculation of tasks from the issues presented in class. Additionally, activity during exercises is assessed. Pass rate: 50% of points.

3. Assessment of knowledge and skills within the LABORATORY is verified on the basis of an oral conversation with the student or a written 10-15 minute colloquium at the beginning of the class, before proceeding with the measurements. Score for reports based on results. In addition, student work evaluation during measurements. Completion of the course based on a positive assessment (minimum grade 3.0) of theoretical preparation for classes and reports on all exercises carried out during the course.

Programme content

1. elements of vector calculus (scalar and vector quantities, operations on vector quantities; geometric interpretation).

2. material point kinematics (uniform and variable rectilinear and curvilinear motion, motion in the field of gravity).

3. material point dynamics (Newton's dynamics, friction, momentum, work, power and energy, conservative and non-conservative forces).

4. rigid body dynamics (moment of force, moment of inertia, Steiner's theorem, principles of rotational dynamics, angular momentum, kinetic energy of rotational motion).

5. principle of conservation in mechanics (principle of conservation of angular momentum, angular momentum, energy), collisions of bodies (perfectly elastic and inelastic), static of a rigid body (simple machines).

6. gravitational field (universal gravitation law, Kepler's laws of planetary motion, weight, field strength, field work, field energy, field potential).

7. statics and dynamics of fluids (Archimedes' law, Pascal's law, Bernoulli's equation, liquid viscosity).

8. elastic properties of bodies (Hooke's law).

9. elements of thermodynamics (heat transfer mechanisms).

10. simple, damped, forced harmonic motion - resonance.

11. mechanical waves (wave refraction and reflection, diffraction and interference phenomena, Doppler effect, basics of acoustics).

12. electric field (Coulomb's law, electric field strength and potential, work of electric field forces, Gauss's law).

13. electric current (direct current, Ohm's law, electrical conductivity).

14. magnetic field (Lorentz force, electrodynamic force).

15. electromagnetic induction (induction flux, Faraday's law, Lenz's rule).

16. electromagnetic waves (Maxwell equations).

17. geometrical and physical optics.

18. elements of special relativity (Galilean transformation, Lorentz transformation, time dilation, length contraction).

Teaching methods

1. Lecture: presentation of program content in the form of a multimedia presentation, presentation of physical experiences in the form of multimedia films, simulation of physical phenomena using computer programs.

2. Exercises: presenting how to solve tasks on the board, calculating the tasks given by the teacher during the classes on the board and outside classes.

3. Laboratory: presentation of results analysis methods on the board and measurements using laboratory equipment, discussing directly with the student how to make reports, including identifying errors in the analysis.

Bibliography

Basic

1. D. Halliday, R. Resnick, J. Walker, Podstawy Fizyki, t. 1-4, PWN 2014,

2. J. Massalski, M. Massalska, Fizyka dla inżynierów, t. 1-2, WNT, Wydanie V,

3. J. Kalisz, M. Massalska, J. Massalski, Zbiór zadań z fizyki z rozwiązaniami, PWN, Warszawa 1971

4. S. Szuba, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2007,

Additional

1. D. Halliday, R. Resnick, J. Walker, Podstawy Fizyki, t. 5, PWN 2014,

2. W. Moebs, S. J. Ling, J. Sanny, Fizyka dla szkół wyższych, t. 1-3, OpenStax, https://openstax.pl/pl

3. I.W. Sawieliew, Wykłady z fizyki, t. 1-3, PWN 2013,

4. K. Jezierski, B. Kołodka, K. Sierański, Fizyka. Zadania z rozwiązaniami. Cz. 1, Oficyna Wyd. Scripta, Wrocław 2000,

5. Jezierski, B. Kołodka, K. Sierański, Fizyka. Zadania z rozwiązaniami. Cz. 2, Oficyna Wyd. Scripta, Wrocław 1999,

6. K. Jezierski, B. Kołodka, K. Sierański, Fizyka. Repetytorium, zadania z rozwiązaniami, Oficyna Wyd. Scripta, Wrocław 2003,

7. K. Łapsa, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2008,

8. H. Szydłowski, Pracownia fizyczna, PWN, Warszawa 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,0
Classes requiring direct contact with the teacher	75	3,0
Student's own work (literature studies, preparation for laboratory classes and tutorials, preparation for tests and exam, preparation of reports for laboratory classes) [1]	75	3,0

[1] delete or add other activities as appropriate