COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics [S1TOZ1>FIZ2]

Course

Field of study
Circular System Technologies

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
0

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

1. Student has knowledge of mathematics necessary to understand and describe the basic issues related to physics. 2. Student has an extended knowledge of classical physics. 3. Student is able to obtain information from the indicated sources of literature, the internet and other sources. He can use formulas, tables and technical calculations. 4. Student understands the need to expand his competences and is ready to cooperate in a team.

Course objective

1. To acquaint students with the practical application of knowledge of classical physics. 2. Developing students" skills in conducting experiments, data analysis, drawing conclusions and preparing reports. 3. Shaping students" ability to independently acquire knowledge, use literature and other sources. 4. Shaping students" teamwork skills.

Course-related learning outcomes

Knowledge:
1. has knowledge of mathematics that allows the use of mathematical methods to analyze the results and errors of measurements [k_w01].

2. has an extensive knowledge of classical physics including issues of mechanics, electromagnetism and optics necessary to understand the phenomena and changes occurring in technological and environmental processes [k_w02].
3. has knowledge of physics necessary to describe the concepts, concepts and principles of closed-loop technology as well as the characteristics of connections and dependencies between its components [k_w03].
4. knows the basic principles of occupational health and safety [k_w28].

Skills:
1. is able to obtain experimental data in the area of classical physics; interpret them and draw conclusions, formulate and justify opinions [k_u01].
2. can perform measurements and analyze the results and formulate conclusions on this basis [k_u03].
3. has the ability to independently acquire knowledge and learn in the field of classical physics, can read with understanding, conduct analyzes, syntheses, summaries [k_u04].
3. correctly uses in discussions and properly uses nomenclature and terminology in the field of classical physics [k_u05].
4. can plan and organize work individually and in a team [k_u08].
5. is able to develop an independent or team report on the performed experimental research [k_u15].

Social competences:
1. behaves professionally in every situation, acts in accordance with the moral principles and principles of professional ethics [k_k01].
2. interacts effectively in a team, playing various roles in it; objectively assesses the effects of his own work and that of team members [k_k02].
3. independently determines and implements the action plan entrusted to him, defining priorities for its implementation, critically assesses the level of advancement in the implementation of the entrusted task [k_k03].
4. objectively assesses the level of their knowledge and skills, understands the importance of improving professional and personal competences adequately to the changing social conditions and the progress of science [k_k05].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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The assessment of preparation for the laboratory is verified on the basis of an oral or written answer (10-15-minute test) at the beginning of the stationary or remotely class based on the issues related to the experiment. Assessment of knowledge and skills to perform the experience during the classes. Assessment of the knowledge and ability to prepare the report on the basis of the results obtained during the classes. The final grade is influenced by all partial grades (theoretical preparation, experimental skills, report preparation skills). The student gets credit for the course after obtaining all grades with a minimum grade of 3.0.

Programme content

Physical experiments will be performed on the basis of the knowledge of classical physics (mechanics, optics and electromagnetism) obtained during the lecture. For each exercise there is a theoretical introduction, the course of the exercise and the preparation of the report. The content of the program includes: analysis of results and errors, linear regression method, normal distribution, mean, standard deviation of the mean, computation of complex errors, rounding results, making charts.

Course topics

During the semester, the student performs 6-7 exercises from among 24 sets of exercises on various topics in physics such as:

1.Mechanics (determination of the moment of inertia, shear modulus, Young's modulus, coefficient of friction, coefficient of linear expansion, coefficient of viscosity),
2. Oscillatory motion (determination of the acceleration due to gravity using a simple pendulum and a physical pendulum, study of torsion pendulums),

3. Wave motion (determination of the speed of sound in air),
4. Electromagnetism (study of thermocouples, determination of the hysteresis loop of ferromagnetic materials, electrodynamic force, Lorentz force, electrical conductivity of conductors and semiconductors, study of transformers, determination of the capacitance of a capacitor),
5. Optics (study of the photoelectric effect, determination of the refractive index of light, focal lengths of lenses, optical spectra, study of diffraction and interference of light, determination of the luminous efficacy of light sources).

Topics related to the analysis of measurement results: arithmetic mean, standard deviation of the mean, normal distribution, determination of uncertainties in simple and complex measurements, linear regression method, graphical representation of measurement results.

Teaching methods

Overview of how to perform the experiment and the methods of analyzing the results on the blackboard. Taking measurements by a student in a group of two with the use of laboratory equipment. Individual discussing with student how to perform measurements and reports. Discussion on the conducted analysis and the content of the report.

Bibliography

Basic
1. S. Szuba, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2007.
2. D. Halliday, R. Resnick, J. Walker, Podstawy Fizyki, t. 1-5, PWN 2014.
3. W. Moebs, S.J. Ling, J. Sanny, Fizyka dla szkół wyższych, t. 1-3, OpenStax, https://openstax.pl/pl.
Additional
1. K. Łapsa, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2008.
2. H. Szydłowski, Pracownia fizyczna, PWN, Warszawa 2003.

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	38	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	12	0,50