COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics for computer scientists 2 [S1Inf1>FIZ2]

Course

Field of study
Computing

Year/Semester
2/3

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
16

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

The student starting the subject should have basic knowledge of physics and mathematics in the field of high school. Simple physical problems are expected to be solved based on knowledge and skills of obtaining information from the indicated sources. The student should also be ready to cooperate as part of a team.

Course objective

1. Acquaintance with the basic methodology of physical measurements and interpretation of real measurement results through the construction of simple mathematical models based on physical laws and theories. 2. Enabling experimental confirmation of basic phenomena and physical laws. 3. Developing students" teamwork skills.

Course-related learning outcomes

Knowledge:
1. has extended knowledge of experimental physics.
2. knows simple mathematical models: (e.g. linear, exponential, logarithmic) adequate to the interpretation of measurement data obtained from the study of simple physical phenomena.

Skills:
1. is able to present the results of a real physical experiment (made during classes) in the form of a simple mathematical model, using elementary statistical methods (linear regression, determination of standard deviation) and widely available mathematical packages.
2. is able to plan and carry out a simple measurement experiment on selected physical phenomena specified in the program content and formulate conclusions.

Social competences:
1. appreciates the importance of IT tools in improving measurement procedures carried out in a physical laboratory.
2. is aware of the importance of reliable documentation of measurement results, enabling verification of the correctness of measurement procedures and detection of potential errors in numerical data analysis.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Credit based on an oral or written response from the scope of content performed laboratory exercises and written reports. The prerequisite is to pass a minimum of 85% of the total planned for students exercises (positive assessment of the responses and reports).

Programme content

11) Classical mechanics,
2) Vibrating movement,
3) Wave motion,
4) Electromagnetism,
5) Optics.
Analysis of measurement results

Course topics

During the semester, the student performs 6-7 exercises from 24 sets of exercises on topics from various branches of physics, such as:
1) mechanics (determination of the moment of inertia, stiffness modulus, Young's modulus, coefficient of friction, coefficient of linear expansion, coefficient of viscosity),
2) oscillating motion (determination of acceleration due to gravity using mathematical and physical pendulums),
3) wave motion (determination of the speed of sound in air),
4) electromagnetism (determination of the ferromagnetic hysteresis loop, electrodynamic force, Lorenz force, capacitor capacity, examination of thermocouple, transformer, electrical conductivity of conductors and semiconductors),
5. optics (determination of the refractive index, focal lengths of lenses, luminous efficiency of light sources, study of the photoelectric effect, diffraction and interference of light, optical spectra).
Issues related to the development of measurement results: arithmetic mean, standard deviation of the mean, normal distribution, determining the uncertainty of simple and complex measurements, linear regression method, graphical presentation of measurement results.

Teaching methods

Preparation for laboratory exercises is based on the instructions contained in the scripts. Exercises are performed in pairs, student progress is monitored on an ongoing basis, the laboratory leader reviews reports, discusses calculations and conclusions.

Bibliography

Basic
1. K. Łapsa, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2008
2. S. Szuba, Ćwiczenia laboratoryjne z fizyki, Wydawnictwo Politechniki Poznańskiej, Poznań 2007

Additional
1. Fizyka dla szkół wyższych – free textbook available on the internet www.openstax.pl
2. D.Halliday, R.Resnick, J.Walker, Podstawy fizyki t 1-5, PWN Warszawa 2003
3. J. R. Taylor, Wstęp do analizy błędu pomiarowego, PWN, Warszawa 2018

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,00
Classes requiring direct contact with the teacher	16	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	14	0,50