COURSE DESCRIPTION CARD - SYLLABUS

Course name
I Physical Laboratory [S1FT2>IPF1]

Course

Field of study
Technical Physics

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

Requirements: Knowledge and skills acquired in the lecture "Fundamentals of Metrology" during the studies in Technical Physics (first level of education, first semester), basic knowledge of physics and mathematics (high school curriculum - basic level). Students are expected to solve simple physical problems based on acquired knowledge and obtain information from indicated sources. Students should also be ready to cooperate within a team.

Course objective

1. To acquaint with the basic methodology of performing physical measurements and the interpretation of actual measurement results through the construction of simple mathematical models based on physical laws and theories. 2. To enable the experimental confirmation of fundamental phenomena and physical laws. 3. To develop students' teamwork skills.

Course-related learning outcomes

Knowledge:
As a result of the conducted classes, the student:
1. Has basic knowledge in metrology, knows, and understands methods of measuring physical quantities

and analyzing measurement results.
2. Has basic knowledge in experimental physics covering mechanics, oscillatory motion, wave motion, electromagnetism, optics.

Skills:
As a result of the conducted classes, the student:
1. Can independently conduct a preliminary analysis of laboratory measurement results and draw conclusions based on literature.
2. Has the ability to self-learn.
3. Can plan, carry out simple measurements, analyze and document research results regarding physical phenomena, assess the importance of basic factors disturbing the measurement.

Social competences:
The student:
1. Can work responsibly on an assigned task, independently and in a team.
2. Understands the necessity and knows the possibilities of continuous learning.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The learning outcomes listed above are verified based on oral or written responses on the content of the performed laboratory exercises (passing threshold 50%) and written reports. To pass the course, students must pass at least 85% of all planned exercises for them (positive grade from responses and reports).

Programme content

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

Course topics

During the semester, the student performs 13-14 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 instructions contained in scripts. Exercises are performed in pairs, the progress of students is continuously monitored, laboratory instructors review reports, discuss calculations, and conclusions.

Bibliography

Basic:

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

Additional:
1. Fizyka dla szkół wyższych - darmowy podręcznik dostępny w internecie 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	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00