Physics laboratory I - Electricity and magnetism - course description

General information

Course name	Physics laboratory I - Electricity and magnetism
Course ID	13.2-WF-FizP-PL-I-EM-S17
Faculty	Faculty of Physics and Astronomy
Field of study	WFiA - oferta ERASMUS
Education profile	-
Level of studies	Erasmus programme
Beginning semester	winter term 2023/2024

Course information

Semester	1
ECTS credits to win	4
Available in specialities	Physics
Course type	obligatory
Teaching language	english
Author of syllabus	• dr hab. Piotr Jachimowicz, prof. UZ

Classes forms

The class form	Hours per semester (full-time)	Hours per week (full-time)	Hours per semester (part-time)	Hours per week (part-time)	Form of assignment
Laboratory	45	3	-	-	Credit with grade

Aim of the course

The aim of the course is to provide students with the phenomenon of the magnetism and with the chosen effects associated with the flow of an electric current. All experiences exercised during the classes are aimed to demonstrate a close relationships between branches of physics mentioned above. An additional purpose of this course is developing a logical thinking skills among students and their creativity.

Prerequisites

Fundamentals of physics and mathematics, ability of analysis and presentation of data, ability of estimating measuring uncertainties.

Scope

In frame of the course the following laboratory exercises are being conducted:

- Determination of the charge and capacity of the capacitor,

- Study of Peltier module,

- Examination of Joule's law of heating,

- Measurement of the electrical resistance, checking Ohm's law,

- Study of circumferences of the direct current (*examination* of Kirchoff's laws),

- Study of transformer functioning,

- Measurement of the inductance and capacities with technical method,

- Resonance in the series and parallel circumference,

- Measuring the dielectric constant of solid materials,

- Study of relaxation oscillations,

- Measurement of the capacity of the capacitor with using Wheatstone's bridge,

- Experimental study of the electromagnetic resonances,

- Study of the vector of the magnetic induction along the axis of the solenoid with using the magnetron method,

- Study of hysteresis loops,

- Measurement of electrical power in alternating current circuits.

Teaching methods

Laboratory exercises preceded by the brief conventional or problem lecture are basing methods of teaching.

Learning outcomes and methods of theirs verification

Outcome description	Outcome symbols	Methods of verification	The class form
The student is able to think and to act in the enterprising way.		• an ongoing monitoring during classes	• Laboratory
The student understands as well as is able to explain the course of phenomena and physical processes using language of mathematics; is able independently to reconstruct theorems and laws and chosen calculations.		• a quiz	• Laboratory
The student applies the method of physical measurements, is able to plan and perform simple physical measurements, analyze measurement data, interpret and present measurement results		• a project	• Laboratory
The student has a general knowledge of basic physics (classical and modern), data acquisition and statistical processing of experimental data.		• a discussion	• Laboratory
The student is able to perform analyzes of theoretical and experimental results and to formulate appropriate conclusions on this basis		• a project	• Laboratory
The student is able to speak intelligible, straight language about physical issues.		• a discussion	• Laboratory
The student is aware of the responsibility for his own work and readiness to comply with the rules of working in a team and taking responsibility for common tasks		• an ongoing monitoring during classes	• Laboratory
The student understands the structure and the principles of operation of research apparatus applied in physics, is able to make the measurement of the physics quantity and to make his interpretation and visualisation.		• a quiz	• Laboratory
The student knows essentials of health and safety at work.		• an ongoing monitoring during classes	• Laboratory

Assignment conditions

Form of receiving a credit for a course is a grade. Performing all exercises along with drawing them up in the form of written report is a condition for passing the course. The grade obtained from every exercise consists of:

- Grade from the preparation for classes 30%

- Grade from the laboratory work 20%

- Grade obtained from the report 50%

Recommended reading

[1] S. Szczeniowski, *Fizyka doświadczalna cz. II*, PWN, Warszawa 1972.

[2] H. Szydłowski, *Pracownia fizyczna*, PWN, Warszawa 1979.

[3] D. Halliday, R. Resnick, J. Walker, Podstawy fizyki - Elektryczność i magnetyzm t. 3, PWN, Warszawa 2006.

[4] T. Dryński, *Ćwiczenia laboratoryjne z fizyki*, PWN, Warszawa 1972.

[5] A. Zawadzki, H. Hofmokl, *Laboratorium fizyczne*, PWN, Warszawa 1961.

[6] J. Szatkowski, L. Lewowska (red.), *Ćwiczenia laboratoryjne z fizyki, część 3, Elektryczność i magnetyzm,* Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 1999.

Further reading

[1] E. M. Purcell, *Elektryczność i magnetyzm*, PWN, Warszawa 1968.

[2] J. Massalski, M. Massalska, *Fizyka dla inżynierów, t.1*, WNT, Warszawa 1975.

[3] H. Szydłowski, *Niepewności w pomiarach. Międzynarodowe standardy w praktyce*, Wydawnictwo Naukowe UAM, Poznań 2001.

[4] R. P. Feynman, R. B. Leighton, M. Sands, *Feynmana wykłady z fizyki*, t. 2 cz. 1, *Elektryczność i magnetyzm, elektrodynamika*, PWN, Warszawa 2009.

[5] R. P. Feynman, R. B. Leighton, M. Sands, *Feynmana wykłady z fizyki,* t. 2 cz. 2, *Elektrodynamika, fizyka ośrodków ciągłych*, PWN, Warszawa 2009.

Notes

Modified by dr Marcin Kośmider (last modification: 06-02-2023 22:49)