COURSE DESCRIPTION CARD - SYLLABUS

Course name
Physics

Course

Field of study
Electromobility

Year/Semester
1/2

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

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Faculty of Materials Engineering
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Responsible for the course/lecturer:
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Prerequisites

Student starting this course should have the basic knowledge in physics and mathematics (secondary school, basic level). The ability of solving the elementary problems in physics based on the possessed knowledge, as well as the ability to obtain additional information from the indicated literature sources, is required. Student should also be aware of the need to expand their competences and be ready to cooperate as part of the team.

Course objective

1. Transfer of knowledge about fundamental basic concepts and laws in the field of classical physics, with an emphasis on applications in technical sciences.

2. Developing students' ability to solve problems in the field of physics, and seeing its potential applications in the studied field.

3. Performing experiments during laboratory classes and analyzing their results based on the acquired knowledge.

4. Development of skills in self-study and team work.

Course-related learning outcomes

Knowledge

1. Student has advanced knowledge in physics necessary to understand the basic physical phenomena occurring in the elements and systems of electromobility; knows the properties and understands the necessity to use various materials.

Skills

1. The student is able to use literature sources, integrate the obtained information, evaluate and interpret them and draw conclusions in order to solve complex and unusual problems in the field of electromobility.

2. The student is able to plan and carry out experiments, including measurements of basic measurable quantities, which are characteristic for electromobility, in typical and not fully predictable conditions; is able to present the obtained results in numerical and graphic forms, interpret them and draw appropriate conclusions.

Social competences

1. The student understands the importance of knowledge in solving problems in the field of electromobility; is aware of the necessity to use the experts' knowledge when solving engineering tasks beyond their own competences.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lectures: written or oral test based on open questions, where student should explain selected physics issues. Passing threshold: 50% of points.

Math exercises: Colloquium where the student's knowledge of solving of physical tasks is checked (in particular proper physical formula application, logical line of thinking, mathematical efficiency in formula calculations also with numerical data and physical units). Passing threshold: 50% of points.

Laboratory classes:
- rating based on the learned knowledge necessary to implement the problems posed in a given laboratory exercise, passing threshold: 50% of points,
- evaluation of the technique and correctness of measurements appropriate for a given laboratory exercise,
- evaluation of the written report: analysis of the obtained results and their measurement errors, accuracy of conclusions,

- evaluation of the ability to cooperate in a group.

Programme content

1. Electromagnetic interactions including: magnetostatics (Gauss's law, Ampere's law, Biot-Savart's law); magnetic properties of matter; electric charges in a magnetic field (Lorentz force, electrodynamic force); electromagnetic induction (Faraday's law).

2. AC circuits including: sources of AC current; RLC circuits; resonance in AC circuits; transformers.

3. Electromagnetic waves: Maxwell's equations and conclusions resulting from them; definition and classification of electromagnetic waves; energy carried by electromagnetic waves.

4. Geometric optics (reflection and refraction laws, lenses and mirrors) and wave optics (diffraction and interference of light, Young's experiment, light polarization).

5. Selected topics of modern physics, e.g.: theory of relativity, photoelectric phenomenon.

Teaching methods

1. Lecture: presented with the use of the multimedia presentations (including: drawings, photos, animations, films), additionally supplemented with examples given on the blackboard and experimental demonstrations.

2. Math exercises: practical exercises relying on common solving of tasks in physics, supplemented in addition with multimedia presentations.

3. Laboratory classes: during the semester student, with the assistance of the teacher, performs 5-7 laboratory exercises from among several sets of exercises on topics from various parts of physics (e.g.: mechanics, wave motion, electromagnetism, optics, modern physics). The classes are aimed at: checking in a practical way the learned physical phenomena, learning how to use a variety of measuring apparatus and acquiring the ability to analyze and develop measurement results.

Bibliography

Basic

1. D. Halliday, R. Resnick, J. Walker, Podstawy fizyki t 1-5, PWN, Warszawa 2005

2. K. Jezierski, B. Kołodka, K. Sierański, Fizyka. Zadania z rozwiązaniami t 1-2, Oficyna Wydawnicza Scripta, Wrocław 2007

3. J. Kalisz, M. Massalska, J. Massalski, Zbiór zadań z fizyki z rozwiązaniami t.1-2, PWN, 1987

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

Additional

1. Samuel J. Ling, Jeff Sanny i William Moebs, Fizyka dla szkół wyższych, Tom I-III, Katalyst Education,

Warszawa 2018; darmowy podręcznik dostępny w Internecie w ramach projektu OpenStax: Pobierz za darmo ze strony https://openstax.org/details/books/fizyka-dla-szkół-wyższych-polska

2. J. Massalski, M. Massalska, Fizyka dla inżynierów t.1-2, WNT, Warszawa 2006

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	55	2,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	45	2,0

[1] delete or add other activities as appropriate